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BEN WITT KEY

(Complete contents inside)

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ARCHIVES OF OPHTHALMOLOGY.

AMŒBIC IRITIS OCCURRING IN THE COURSE OF NON-DYSENTERIC AMŒBIASIS.

By Dr. LLOYD MILLS, Los Angeles, California.

A STUDY of the mass of literature which is concerned with the ætiology of iritis gives convincing testimony of the rôle played by laboratory and general medical advance in the elucidation of that group of cases of uncertain or unknown diagnosis which, as "rheumatic iritis" and latterly as "toxæmic iritis," have formed the main diagnostic rubbish heaps of this subject.

The marked association of iritis with chronic arthritis, which appeared as "rheumatic iritis" in the text-books and ætiological tables of hardly a decade ago and which comprised about 25% of all forms of iritis, has been resolved into its dental, tonsillar, nasal, respiratory, genito-urinary, intestinal, and acute general infections components-of-origin. A relatively small percentage of cases now forms the unknown or uncertain residue of this group.

The resolution of the "toxæmic iritis" group has been begun in like manner by the illuminating researches of Rosenau (1), of Irons, Brown, and Nadler (2), and of Irons and Brown (3), who proved both the active and selective part which bacteria play in the production of iritis. This rôle has been verified clinically and bacteriologically in many cases of iritis associated with focal and general infections, including me-

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tastatic panophthalmitis, and the streptococcus, staphyloccus, colon bacillus, typhoid bacillus, pneumococcus, influenza bacillus, gonococcus, and meningococcus intracellularis, among others, have been recovered from the eyes in pure and mixed infections.

There is, of course, a true rheumatic iritis, arising in association with acute rheumatic polyarthritis, but such an association is rare, considering the frequency with which inflammations of the serous membranes occur. It probably would be inexact also, to state that toxæmic iritis does not occur, but true cases of the sort must be very rare. Even in such frankly associated systemic and iritic changes as are reported by Wray (4), Hiram Woods (5), Guibert (6), Brawley (7) and others, as due to the toxic products of disordered metabolism, it is altogether in keeping with the known facts to hold that the iridic lesions result from bacterial invasion of the intestinal wall and their implantation in the form of bacterial emboli in the uveal tract, where their symptoms are produced by their presence and by the direct local action of their toxins. Elschnig (8), in fact, insisted long ago that a study of patients of this type "might lead to the recognition of a definite group of diseases of the uveal tract called into existence by infections of bacterial origin arising in the intestinal tract." A modification of this statement to read "bacterial and protozoan origin" would be more fitting in the light of our present knowledge.

The elucidation of the causes of human iritis is usually simple. The co-existence of a frank general malady; positive reactions to the Wassermann, von Pirquet and gonococcal complement fixation tests; symptomatic improvement or cure following specific treatment in lues or tuberculosis, or resulting from the removal of demonstrated foci of infection, or from the mastery of acute or chronic intestinal disturbances, provides the bulk of evidence for our assumptions of origin. Where but a single source of infection is found and its relief coincides with the relief of a previously intractable iritis, or where the successive removal of several sources of infection has had no influence upon an intractable iritis until improvement or cure has followed the eradication of a last source of infection, the conclusions as to origin may be drawn with

reasonable certainty. Multiple infections, such as syphilis, tuberculosis, alveolar abscesses, and gonorrhœa coexist not rarely in the same individual and in such cases the exact factors of origin may never be determined.

Reasoning from the assumption that iritis represents a bacterial or parasitic metastasis from a known or undiscovered source, its recurrence, then, must be ascribed to the persistence of the constitutional or focal basis of the disease or infection.

In spite of the ample facilities for exhaustive investigation now current, there still remain cases of iritis, usually of the chronic, recurring, and "quiet" types, frequently exhibiting the articulo-ocular syndrome, whose origins are obscure and for which the treatment, prolonged and often unsatisfactory, is wholly symptomatic.

Such a case came to me in April, 1921, and its solution, confirmed by the identification of two more recent but similar cases, provides an explanation of the origin of part, at least, of this group of resistant and intractable irites and offers the hope of cure or symptomatic relief to a group of patients whose outlook has been almost hopeless up to the present.

Miss N. M. B. aged 44, a seamstress, came to California from Illinois eleven years ago. She had never been outside of this country and was never in our Southern States. She was an only child and her mother died of cancer and her father of infection following an incised wound. She had never been a strong child, having had scarlatina when six weeks old. Measles when nineteen led to the continuous use of glasses. She has always been constipated and has always suffered more or less from digestive disturbances. She likes raw foods, especially raw fruits and vegetables.

In 1911, after a particularly hard day at the sewing machine facing strong light, the right eye became red and the lids rough and "scratchy." A few days later a physician found the iris adherent to the lens, from which he was unable to separate it, in spite of vigorous and prolonged atropinization. At this time the eye was not especially painful, though it became intensely so later. The first attack was followed by frequent exacerbations over a period of about ten years, the ocular symptoms always accompanying or following "intestinal attacks," whose main features were severe pain and soreness in the epigastrium, persistent constipation, and especially a "sense of a load of bricks in the stomach," the latter symptom being one from which

she was never wholly free at any time. There was an almost constant feeling of exhaustion, of abdominal weight, and an inability to move the bowels save by enemas. At times the feeling of exhaustion "seemed almost to paralyze" her. Pains in both knees, especially the left, and in the right shoulder were so common accompaniments of these attacks as to give rise to the diagnosis of "rheumatic iritis" and led to heavy and prolonged salicylate treatment, without result. There were no swellings of the joints. The sight of the right eye failed with each attack until finally it distinguished merely the difference between light and darkness. During the last three or four years of this condition the pain in and around the eye could be relieved only by an average daily dose of 65 grains of aspirin. At times the use of a large soap enema at the beginning of an attack would abort it. Abdominal cramp and soreness were noted often. Several teeth which showed apical abscesses were extracted in 1920, but without relief. The nasal sinuses, heart, lungs, pelvic viscera, and urine were negative. The blood Wassermann was found negative on several examinations and two von Pirquet tests were also without result.

In April, 1921, the pain and inflammation in the right eye had become uncontrollable. The lids were swollen and red, the globe was violaceous and heavy leashes of dilated vessels had formed about the limbus as in multiple phlyctenular inflammations, but minus the phlyctenules. There was no corneal involvement. The anterior chamber was made shallow by an iris bombé caused by dense gray-brown adhesions between lens and anterior capsule along the whole margin of the pupil. Tension 5*mm* Hg. by the MacLean tonometer. The iris was highly vascularized, the large vessel-trunks twining through the reticulum of the iris like stout vines through a trellis. The plastic material which had formed the posterior synechiæ had spread itself broadly over the front of the lens which appeared to be cataractous. There was very faint red reflex and uncertain light projection.

Because of the intolerable pain, the intractable type of inflammation, and the evident impossibility of relief to pain or sight by any lesser measure, the eye was enucleated under local anæsthesia on April 27, 1921, at the Methodist Hospital. Our pathological service had not been standardized at that time, no histological study of this invaluable specimen was made, and a really great pathological opportunity was irretrieveably and regrettably lost. Macroscopic inspection, aside from full corroboration of the findings noted above, showed a cataract which involved the anterior

half of the lens, as if the plastic material poured over its anterior surface had soaked into the lens to that depth. The vitreous was fluid and the nerve head moderately but obviously cupped from the secondary glaucoma. There was no gross retinal pathology. The convalescence was normal.

On May 24, 1921, the left eye, which had never been inflamed and whose vision was $\frac{6}{6}$ and Jaeger No. 1 with the post-cycloplegic correction of plus 0.25 sphere and the reading addition of plus 0.87 sphere, began to ache and to blur. This eye was not seen until the disturbance had lasted 6 days, by which time ominous, heavy-looking posterior synechiæ had formed, especially nasally, where cluster-like exaggerations rolled over the adjacent lens capsule like lava ridges. A moderate precipitate existed on Descemet's membrane and, with a slightly turbid aqueous, obscured the fundus. Vigorous treatment with moist heat, 2% atropine solution every hour, 10% dionin every 2 hours, and free bowel action by catharsis and enemas led to rupture of the posterior synechiæ over the entire circumference in 11 days. Considerable plastic matter remained on the anterior capsule and gradually disappeared in about three months.

At this time excessive uterine bleeding occurred from no apparent cause. Two internists and a general surgeon could find no cause for the bleeding or for the persistence of the ocular trouble. A pair of normal tonsils were removed on suspicion. A course of free intestinal elimination was next undertaken by the internist, in which daily high enemas, saline catharsis, and restricted diet, together with rest in bed, played the main part. Some feeling of general betterment followed three weeks of this régime but another attack of ocular redness, pain and plastic exudation occurred a few days later and was relieved by the prompt use of atropine and heat. These attacks recurred now every three to five days, with continuous severe pain, relieved only by repeated doses of aspirin, the eye was constantly tender and photophobic, and it was necessary to keep the pupil continuously dilated. The least lapse in this dilatation would result in the formation of synechiæ. A feature of the inflammation was the gathering of dilated anterior conjunctival vessels about the limbus in the form of vascular leashes, as was so marked a sign in the right eye, and a type often noted to a slighter degree in conjunctival inflammations associated with systemic conditions.

Realizing fully that the basic disorder had not been discovered in this case and with the prominence of the intense pallor, general weakness, and the abdominal symptoms as

the essential syndrome for solution, I referred the patient to Dr. John V. Barrow, in the belief that we were dealing with a parasitic disorder of the intestine, probably amœbic.

Dr. Barrow noted "A very sallow-skinned woman of middle age with heavy black circles around her eyes and an appearance of extreme lassitude and weakness." The outstanding features of his examination were: Abdomen slightly full and tympanitic. Tender over whole abdomen but extremely so over entire colon. Blood pressure low, the systolic being 100 and the diastolic 55. Temperature 98; pulse 80; respiration 18. All reflexes exaggerated. A catheterized specimen of urine was clear, acid, 1020 Sp. Grav., negative for sugar, albumen, casts, parasites, or indican. Blood examination: Hgb. 76%; red cells 4,070,000; leucocytes 6,800; polymorphonuclears 63%; mononuclears 32%; transitionals 4% and basophiles 1%. The first examination of the feces showed a light brown, soft, alkaline stool without blood, but containing many inactive CHILOMASTIX and a predominant number of BLASTOCYSTS and cocci. A second stool yielded almost identical findings but the third one revealed large numbers of ENTAMŒBÆ DYSENTERIÆ (HISTOLYTICA).

On June 5, 1922, anti-amœbic treatment was begun at the Los Angeles County Hospital, the ocular pain and inflammation persisting the while, and with no change in the symptomatic ocular treatment. Sixty grains of ipecac in the form of keratin-coated tablets were given by mouth the first night, together with ⅓ grain (0.022*grm*) of emetin hydrochloride intramuscularly. The emetin was repeated each night, with a nightly reduction of ten grains in the dose of ipecac. No purge or enema preceded or accompanied this treatment, but morphine gr. ¼ or pantopon gr. ⅓ were administered about one half an hour before the ipecac, in order to lessen peristalsis. Ice bags were placed on the throat and epigastrium and perfect bodily quiet maintained.

The improvement in well-being, color, initiative, and especially in the ocular condition which resulted from this course of treatments was little short of marvelous. The ocular redness, pain, tenderness, and iritic swelling disappeared entirely and, although atropine was omitted cautiously two weeks later, the eye has since remained wholly free from inflammation. Some unexplained pain has occurred at times. The sense of abdominal weight passed away during the first week of treatment and has never returned. A similar though less severe course was given at home four weeks later and led to the complete disappearance of the amœbæ from the stools. Emetin has been continued

every second day and two five grain tablets of ipecac every second night, but this is being reduced. The object of this persistent and possibly needlessly intensive use of ipecac is in order to maintain a persistent saturation of the body with ipecac in order to greet the amœbæ in case they should reappear in the intestinal current from some point inaccessible to treatment. Lately an intravenous solution of iron has been given for its effect upon the anæmia.

This case has been under careful observation for five months. The iritis is cured and the tendency to relapse, if it exists, is wholly controlled, as was well shown in December, 1922, when a severe attack of influenza was passed through without scathe. To summarize this case: The patient is a woman of middle age, who suffered from intractable, plastic iritis in the right eye for ten years. This led finally to occlusion of the pupil, secondary glaucoma and blindness, the intolerable pain finally forcing an enucleation. An identical iritis started in the remaining eye three weeks after the enucleation of the first. The outstanding general symptoms have been marked constipation, pallor, pains in the joints, and intense weakness and lassitude. The noteworthy physical findings were a well-marked secondary anæmia, decided tenderness over the colon, and the presence of large numbers of ENTAMŒBÆ DYSENTERIÆ in the stools. A simultaneous cure of the iritis, of the abdominal symptoms and signs, and of the general extreme depression resulted from two intensive courses of treatment with ipecac and emetin and coincided with the disappearance of the amœbæ from the stools.

Inasmuch as no change in the treatment was made other than that of the specific anti-amœbic measures, it seems reasonable to assume that this is a case of bilateral iritis arising from non-dysenteric amœbiasis and, I believe, the first case of the sort ever recognized. The importance of this case, as typifying a form of iritis which has hitherto escaped identification, is confirmed by two similar cases referred to me by Dr. Barrow on January 11, 1923, and first seen by him during the previous week. A fourth case was reported by Dr. Barrow in a personal communication, but no ophthalmic findings are available in this case.

The first of these three additional cases bore the following

explanatory letter from her physician, a well known ophthalmologist of Omaha:

> Mrs. H. J., an old patient of mine, has had a most discouraging time with her eyes. Her trouble began with an optic neuritis which gave the impression of being specific but nothing could be found to confirm this suspicion, and specific treatment was of no use. Since then she has had repeated attacks of iritis, with more or less trouble with the vitreous. She has had all sorts of things done for her in the attempt to root out all possible foci of infection, and at one time took a long tuberculin cure to cover that possibility. In spite of everything these attacks have recurred and, during them, the thing that has done her the most good has been full doses of sodium salicylate, *i.e.*, 30 grains taken from three to five times a day.
>
> This patient, 34 years of age, was born in Nebraska and had never been out of the United States nor in our Southern States. Her youthful life had been healthy, save that for about 20 years constipation had been so marked that she was forced to rely upon cathartics all the time. From the time of maturity she has "always been tired out."
>
> The first ocular inflammation appeared in February, 1916, and recurred each winter thereafter, the left eye always being the worse. Has had frequent nasal and bronchial colds, which have always been difficult to stop. The attacks varied somewhat in intensity. The teeth were extracted save for the upper central incisors. In 1920 she went to the Mayo Clinic, where nothing was found to account for the trouble. It is worthy of note as to the common ophthalmologic attitude in these cases, that in spite of the patient's solicitation no examination of the stool was made. In 1920 severe post-cervical neuritis was followed by a very painful attack of iritis, after which the left eye was found to have become practically blind. Much plastic matter appeared in the right eye during the recurrence of 1922, although this was not a painful year.
>
> Examination showed the lids of both eyes to be moderately red and thickened. The conjunctiva of both globes was red, thick and suffused, the process being clearly a chronic conjunctivitis. There was no ciliary injection at this examination. The right pupil was slightly larger than the left, irregularly adherent to the lens, especially nasally where the plastic material had poured over upon the lens capsule in the form of a delicate annular tracery of brown. The right pupil had remained round and capable of moderate

but symmetrical dilatation until the last attack which occurred a month before. Now only the temporal half dilates feebly under atropine. In the left eye the entire margin of the pupil is bound to the lens capsule, save for a few tiny defects in the ring. A heavy layer of transparent plastic matter, looking almost like a shellac, covers the entire pupillary area and is prolonged upon the anterior surface of the iris, flattening it down upon the lens and making the anterior chamber deeper than that of the right eye. There appears to be a beginning incipient cataract in this left eye. The red reflex is still obtainable but the layers of old inflammatory product have obscured all detail of the fundus. Vision is limited to the appreciation of light and darkness. Light projection is uncertain. Vision in the right eye is $\frac{6}{60}$ and Jaeger No. 8, incapable of improvement.

The salient features of her general physical condition were a systolic pressure of 85 and a diastolic of 65, a very tender colon, the tenderness being decided over the cæcum and the descending colon. There is a spot of arrested tuberculosis in the right upper lobe anteriorly. Blood: Hgb. 80%, reds 4,120,000, leucocytes 8,600, polynuclears 57%, mononuclears 41%, basophiles 1%, and eosinophiles 1%. The first two stools were brown, formed, alkaline, without blood and contained active CHILOMASTIX and cysts of ENTAMŒBÆ DYSENTERIÆ. The urine was pale, clear, 1010, and acid. No sugar or albumen. Indican increased. On Jan. 4, 1923, emetin was begun. At this time the stool contained large numbers of BLASTOCYSTS and CHILOMASTIX and E. DYSENTERIÆ. Four days later no parasites were found and nine days after the treatment was begun the chronic conjunctivitis, which was the notable feature of her facial appearance, had undergone a decided improvement. This case is still under intensive treatment, made especially urgent because of the dangerous situation to sight in her sole functioning eye.

The third case, Mrs. A. H., aged 50, had never been outside the middle West of our country. She gave the characteristic history of constipation of many years' duration and of "dragging around all the time just as if I am recovering from a severe illness." For the past 30 years there have been attacks of inflammation and pain in the eyes and for the past 10 years the right eye has suffered from a recurring ulceration of the cornea. The eyes are seldom free from redness and more or less photophobia. During the acute attacks the pain and inflammatory reaction have been so great that she has been confined to bed for weeks at a time. There had been no attacks of

iritis during the past three months but the corneal ulceration recurred about a month ago.

At the time of the first examination here the lenses were both flecked with iris pigment and plastic débris, the residue of repeated old attacks of iritis. A strand binding the iris and right lens together temporally was broken by the use of atropine. The irides were somewhat atrophic. The right cornea showed a depressed fascet of white scar tissue about 2 x 1 x ½*mm* in area, at the temporal limbus at about axis 180. In its center was a rough zone, occupying about ¼ the area of the whole scar and representing the recent active ulceration. There was decided chronic conjunctivitis in each eye, with notably enlarged anterior conjunctival veins of the type seen in the eyes where conjunctivitis arises out of systemic conditions. Vision, with correction, was $\frac{6}{9}-2$ and $\frac{6}{6}-2$ and Jaeger No. 2 and No. 1 respectively.

The blood Wassermann was negative; teeth and tonsils have been removed. Hysterectomy for fibroids 19 years ago. Blood pressure 110–70; tender colon, ascending colon, hepatic and sigmoid flexures being especially so; fine rales in the left apex; Hgb. 78%, reds 4,024,000, leucocytes 9,600, polynuclears 61%, mononuclears 22%, transitionals 11%, eosinophiles 1%. The stools at the first examination were found "loaded" with the typical cysts of the ENTAMŒBÆ DYSENTERIÆ. Emetin treatment was begun on Jan. 8, 1923, too early to report the results.

The fourth case of this group came under Dr. Barrow's observation in 1908. Severe recurrent iritis led to chronic and almost disabling ocular inflammation and visual disturbance for over 6 years. The patient, Mrs. J. B., was a young woman who suffered from constipation, abdominal tenderness, and marked lassitude. ENTAMŒBÆ DYSENTERIÆ were found in the stools in 1912, were eliminated by emetin treatment lasting over some months in several courses and with their elimination the ocular and iritic inflammations disappeared and have never recurred to date, though the patient is seen frequently.

A fifth case, Mrs. J. K. of Long Beach, Cal., is now under examination. Repeated, violent attacks of superficial punctate keratitis have led to so extensive scarring of the left cornea that this eye has only $\frac{3}{60}$ vision, incapable of correction. The right eye is being gradually overrun by a chronic recurring ulceration which started at the temporal limbus and which has gradually pushed its way, with each new attack, across the corneal center until the outer $\frac{2}{3}$ of the cornea are occupied by dense scar tissue. The center of the cornea breaks down, the eye becomes exceedingly red and

vision becomes noticeably reduced. The peculiar feature of these attacks is that while the cornea is normally sensitive to the touch, there is no pain in connection with these attacks. The stools, constipated as in the other cases, showed on Jan. 18, 1923, enormous numbers of the flagellate GIARDIA and their possible relation to the corneal ulceration is under investigation, with the similar ulceration noted in case three in mind.

We have here the report of four cases of intractable iritis, all giving characteristic histories of non-dysenteric amœbic infection of the intestine, all showing ENTAMŒBÆ DYSENTERIÆ in their constipated stools. In every case the fact that there was no dysentery threw the various physicians who had cared for these patients during many years completely off the diagnostic track. Cure resulted in two of these amœbic irites with the use of ipecac preparations by mouth and hypodermically as the sole addendum to their local treatment. Treatment is not yet sufficiently advanced in the other cases to make their value more than suggestive of the pathologic relation which may exist between iritis of the chronic, intractable sort and non-dysenteric amœbiasis. That this relation is a vital one is shown by my first case and confirmed by the fourth case, coming under Dr. Barrow's personal observation.

The study of the parasitic ailments of man is still so fragmentary and so much in its infancy that refinements of observation to special features of parasitic effects upon such limited portions of the body as the eyes had made comparatively little headway. There are but few, even among the relatively small group of physicians who have some knowledge of zoology, who are qualified to recognize and identify the individuals of the varied array of the parasitic protozoa which make man their host and the human intestine their immediate domicile. This parasitism has come about through the accidental inclusion of free-living species and their cysts or, as Kofoid and Swezy put it so interestingly, by the fact of their habituation through evolutionary derivation from the intestinal parasites of the ancestors of the human stock, perhaps even back into the invertebrate groups.

PROBABLY THE GREATEST SINGLE FACTOR WHICH HAS

HINDERED THE EARLIER AND MORE GENERAL RECOGNITION OF THE PATHOGENICITY OF THE HUMAN INTESTINAL PROTOZOAN FAUNA HAS BEEN THAT THE ONE CRITERION OF THEIR CAPACITY FOR HARM HAS BEEN GENERALLY AND WRONGFULLY ASSUMED TO BE THE PRESENCE OF DIARRHŒA. A slight knowledge of the evolutionary history of the flagellates of man such as, for example, CHILOMASTIX, GIARDIA, TRICHOMONAS, and CRAIGIA, makes it apparent that, as the result of an evolutionary development coincident with that of their human host, there has been so excellent an adaptation that these organisms, like bacteria, may and do live in their host without symptoms of infection. When the balance between host and parasite becomes changed however, as a result of digestive faults, of conditions which cause intestinal stasis or of lowered resistance from other intestinal or general infections, whether parasitic or bacterial, then the enormous multiplication of parasites which ensues causes mechanical and probably chemical irritation, to which the final local reaction on the part of the host is expressed as diarrhœa in a considerable proportion of cases. Barrow (10, 25), from whose direct inspiration most of the clinical and much of the laboratory activity now manifest in these problems in California has sprung, has summed the facts of this symptom in recent papers and stresses the remark that "dysentery is not the all-important symptom in any chronic and heavy protozoan infection. It is often an attendant symptom, but by no means the most direct expression of the malady. In fact, partial stasis produces the only successful incubator for protozoan parasites of any type and upon this rests the ability of the otherwise harmless parasites to develop substances of great pathogenic power, of long duration and certain, chronic, telling effect upon the host. Systemic poisoning is manifested by a definite disturbance of metabolism, joints, blood-forming organs, endocrine function, nervous system, psychic imbalance, which, with dysentery, make the sum total of chronic protozoan infection." In Reed's admirable paper, which has been repeatedly drawn upon, he states that the usual form of infection in California being non-dysenteric, its symptoms are so unexpected and variable that this type of infection is usually the last possibility to be

considered. "Almost any variety and degree of neurasthenia, physical depression, constipation, loss of weight, anæmia, digestive trouble, vague aches and pains and indefinite ill health may be associated with amœbiasis and disappear when the amœbæ are eliminated." The logical application of so varied a symptomatology is that IN ALL CASES OF CHRONIC INTRACTABLE IRITIS OF UNCERTAIN OR OBSCURE ORIGIN AND ESPECIALLY IN THOSE PATIENTS WHO SUFFER FROM GASTRO-INTESTINAL DISORDERS, PROTOZOAN, AND PARTICULARLY AMŒBIC, INFECTION, MUST BE CONSIDERED AS A POSSIBLE ORIGIN OF THE OCULAR INFLAMMATION.

Kofoid and Swezy (12) state that, in contrast with the bacillary infections which produce diarrhœa, the protozoan infections are more resistant and pass more readily into the carrier phase, in which the host appears to have normal health, though liable to relapses. The assumption that amœbæ cannot multiply outside of the body and "that the progress of the contagion under normal conditions of sanitation is slow, makes an epidemic of amœbiasis improbable. Its spread by food handlers, by household contacts, and, in favoring circumstances of poor sanitation, by flies and water, will make its progress all the more insidious because it is not catastrophic and because AN UNKNOWN BUT PROBABLY LARGE NUMBER OF INFECTED PERSONS EXHIBIT NO SYMPTOMS OF DISEASE, OR NO SYMPTOMS ASSOCIATED WITH DYSENTERY." It is also a well proven fact that THE ONLY EVIDENCE THAT CURE OF AMŒBIASIS OCCURS IN THE ABSENCE OF SPECIFIC TREATMENT IS BASED UPON THE EXAMINATION OF AN INSUFFICIENT NUMBER OF STOOLS OR UPON THE FINDINGS OF WORKERS WHO ARE INEXPERIENCED IN THE IDENTIFICATION OF PROTOZOAN FORMS.

It is remarkable that the possible relation of this form of intestinal infection to ocular inflammations, particularly to those of low grade, has not attracted more attention, when the extent of the spread of amœbiasis in the human race is considered. Some authorities estimate that as high as 10% of the population of the globe is infected.

Reed reports a high incidence of infection in California, largely because of the relation of California to the trade routes, to immigration from the Orient and Mexico and tour-

ist travel from Asia. He shows further, that WHILE AMŒBIASIS FORMERLY WAS CONSIDERED AS A TROPICAL INFECTION, IT IS KNOWN NOW TO INVADE PRACTICALLY EVERY COUNTRY OF TEMPERATE CLIMATE AS WELL AS THE TROPICS, WITH THE STRIKING CLINICAL DIFFERENCE THAT DYSENTERY IS A FAR MORE PREDOMINANT FEATURE OF THIS FORM OF INFECTION IN THE TROPICS THAN IN HIGHER LATITUDES.

The story of the life-cycle of the amœba is, of course, common knowledge. The infected person who is suffering from active dysentery is discharging vast numbers of free-living amœbæ. In the carrier phase, however, which comes between the acute attacks, and especially under conditions of intestinal statis, the organism assumes the resistant form and great numbers of this encysted stage of parasites are discharged. These cysts are swallowed by man and pass unchanged into the small intestine, where the cyst wall is dissolved and where it is probable that a single quadrinucleate amœba is released. This soon subdivides into four new amœbæ which are carried to the colon by the intestinal flow and remain in the colon as their sole point of invasion, almost without exception. Invasion is accomplished, apart from the secondary invasion of lesions of bacterial origin, by the organization of large numbers of amœbæ on the surface of the mucous membrane and through the gradual erosion of this membrane by their physical activity and probably by the secretion of a cytolytic ferment. Dobell (24) states that the amœbæ do not burrow between the epithelial cell walls, but that they frequently invade the tissue through the crypts of Lieberkühn. This erosion may develop into the characteristic amœbic ulceration, which ceases when the amœbæ are removed by specific treatment. In his classical work on Tropical Diseases, Manson (13) describes the mucosa in dysentery as being slightly swollen, red and injected, the surface softened and perhaps eroded and covered with a blood-streaked glairy mucous of the same character as that which appears in the stools. In the severe cases the erosions have climaxed as ulcers and patches of gangrene which involve, mainly, the sigmoid flexure and the descending colon. "These ulcers extend by burrowing deeply along the submucosa, with sloughing of the superjacent membrane and offer admirable opportunity

for secondary infection in their long, suppurating fistulous tunnels," a secondary infection which frequently occurs to supplement or to inhibit the local and general effect of the specific causes of the colitis.

In the non-dysenteric infections amœbæ may remain in the lesions for considerable periods, which explains the intermittence of their appearance in the stools and stresses the necessity for repeated examination in suspicious cases before a negative finding is finally admitted. Six consecutive daily specimens should be examined, including formed as well as fresh liquid stools, and the identification must be made by a competent person.

The appearance of amœbæ in liver, lung and brain abscesses proves their capacity for invading the blood stream from the intestine, their only known portal of entry. There is no convincing evidence as yet, that human protozoa ever multiply in the blood stream as do the trypanosomes, the spirochætæ of relapsing fever, and the plasmodia of malaria. Long bone and joint involvement, enlarged spleens which are resistant to quinine, rebellious skin infections of obscure types, and appendiceal inflammation are other clinical results of amœbiasis which suggest, however, a greater capacity for tissue invasion than is commonly believed. Kofoid and Swezy (9) state, in their admirable article on "Flagellate Infections of the Human Digestive Tract," "It is to be expected from their structure and from our knowledge of their occurrence and distribution in other vertebrates that the principal flagellate parasites of the intestine may have more generalized capabilities of tissue invasion than have been suspected or detected hitherto. When culture methods for these flagellates shall have been perfected and the protozoan contents of the blood stream more fully searched out by mass cultures, we may hope to have more light on the relation of these parasites to those obscure syndromes to which they have thus far been related so indecisively and uncertainly by clinical and biological investigation." As a partial basis for such belief they report the work of Chatton who, in 1919, examined 1093 Geckos in Tunis and found the intestinal flagellate, TRICHOMASTIX, in 4 individuals, once in a smear from the lung and three times in blood cultures in 136 inocula-

tions. The organisms grew on blood gelatose and in ascitic fluid with sterile liver. Hinkleman, in 1919, also reported that 5*cc* of blood from a human case of diarrhœa and intermittent fever, mixed with distilled water and centrifuged, contained motile bodies showing all the features of TRICHOMONAS INTESTINALIS. He also reports a second case of diarrhœa in which CERCOMONAS HOMINIS (possibly CHILOMASTIX) was isolated in the same manner. Fairise and Jacquot (1913) report a fatal case of enterocolitis with infiltration of the intestinal wall by GIARDIA. "The appearance of TRICHOMONAS in the pleural transudates and exudates in man and so frequently in cancers, ulcers and lesions of the mouth, jaws, tonsils, esophagus and stomach, and in liver abscesses, is at least suggestive that it and possibly other intestinal flagellates may have tissue invasive powers in man." Tissue invasion by intestinal flagellates also has been reported conclusively in birds of various sorts, rats, antelopes, turtles, frogs, tortoises, and snakes, and gives further weight to the inference of unexpected capacity of the rhizopods for tissue invasion.

Convincing confirmation of this invasive capacity on the part of amœbæ in man is given by Barrow's case of hypertrophic arthritis of the spine, noted by Reed (11), by the more recent work of Kofoid and Swezy (14, 15, 16), and that of Ely, Reed, and Wyckoff (17) in the identification of ENTAMŒBÆ DYSENTERIÆ in the bony lesions of arthritis deformans, and through the recognition of the same amœba in the lymph glands in Hodgkins' disease by Kofoid, Boyers and Swezy (23). Identification of amœbæ in the tissues is made difficult by the similarity of motility and cytology of the human leucocyte and the amœba, but the distinction has been made conclusively along the critical morphologic lines of their characteristic differences in mitosis and chromosome numbers. Inasmuch as the E. DYSENTERIÆ has not been cultivated and experimental lesions cannot, therefore, be produced, such cytological evidence, combined with a careful histological study of the iritic tissue changes, must furnish the means of finally proving the exact manner in which the eyes are involved in what I have called "Amœbic Iritis" because of its association with amœbic intestinal invasion. With more extended study

the term may become "Protozoan Iritis," if it should be shown that flagellates also give rise to iritis. In similar fashion our nomenclature may come to include "Amœbic (or Protozoan) Conjunctivitis" and "Amœbic Ulcers of the Cornea" or "Corneal Ulcers associated with Amœbiasis."

Until further clinical, pathologic, and experimental study shall have made clear the exact and immediate cause of involvement of the iridic tissues in these cases of non-dysenteric amœbiasis, the probable means of such involvement are (1) through the mechanical presence of amœbic emboli, (2) through bacterial emboli which have entered the blood stream from the intestinal lesions as a secondary infection. Both of these factors may be active for harm and either may activate the other. (3) The intense systemic depression seen in these cases, almost without exception, is ascribed to toxæmia and the possibility of the absorption of amœbic or bacterial poisons, or of foreign proteid substances through the intestinal lesions and of their possible local effect upon the eye must be mentioned.

Finally, while Reed believes that much of the value of the ipecac treatment is derived from the improved elimination, from the cleansing effect of colonic irrigations, and from a diet designed to reduce putrefactive changes, such a régime gave no benefit to my first case, nor to the fourth case reported, and cure followed the free and persistent case of ipecac and emetin. Likewise in the second case, still under treatment, the first massive dose of ipecac led to a decided clearing of a chronic conjunctivitis, uninfluenced hitherto by intestinal treatment.

The literature concerned with ocular disorders arising from intestinal parasitic infections and especially those of protozoan origin is exceedingly meager. But two cases are reported, one of them being doubtful and the one genuine case of amœbic iritis occurring in relation to an acute dysenteric attack. The possibility of this form of involvement of the eyes is not mentioned in Würdemann's (18) admirable monograph on "Ocular Parasites" and only Elliott (19), commenting on the case of undoubted amœbic iritis mentioned above, seems to have sensed to a degree the pathologic possibilities involved in the relationship. Practically all of the ocular

complications which are recorded as arising during the course of dysentery have been due to bacillary dysentery, in which there is a high incidence of arthritic disturbance, of urethal discharge of non-gonorrheal origin, and often a long course, with frequent exacerbations. In the light of our present knowledge it is conceivable that some of these chronic cases may represent mixed bacterial and protozoan infections, possibly activating each other. Santos Fernandez (20) speaks of the ocular symptoms of bacillary dysentery as falling into a reflex group which includes paresis of accommodation, opacities of the vitreous, and atrophy of the papilla; and an inflammatory group, embracing conjunctivitis, keratitis, and uveitis, produced by the passage of germs proceeding from the colon through the circulatory paths.

Houdart (21) reported that a gunner in the French marines, aged 34, was taken suddenly with pain in the left eye, while convalescing from chronic diarrhœa, acquired during a stay of six months on the River Sargon in China. The next day this eye was found to be blind from irido-cyclitis. A smear made from pus, which had been withdrawn from the anterior chamber by puncture, showed staphylococci and streptococci. The second eye was lost from sympathetic ophthalmitis in spite of enucleation of the first. At the same time an abscess of the liver, which contained sterile pus and which was presumed to be an amœbic abscess, was operated upon.

The only case of iritis hitherto recorded as occurring in the course of amœbic dysentery and in which a definite relation is established between the amœbic infection and the iritis, occurred in the practice of R. Pacheco Luna (22). The patient was a girl of 18 with no history of previous general or ocular disturbance. The onset of iritis was preceded by moderately severe dysentery which lasted one week and yielded to diet and to intestinal lavage with creolin. On the fourth day of her convalescence ocular symptoms appeared and persisted in spite of all treatment. Luna saw her three weeks later, by which time a moderately severe plastic iritis had led to the production of marked posterior synechiæ. These adhesions were broken up by the use of a mydriatic but the redness, photophobia, and discomfort persisted. An examination of the stool, actuated by the history of an antecedent dysentery,

revealed large numbers of E. DYSENTERIÆ. No change was made in the local treatment, as in my own non-dysenteric cases, but injections of 0.08*grm*, of emetin hydrochloride were begun, with a daily increase of 0.02*grm*, until 0.12*grm* was given daily, without inconvenience. Improvement followed the first injection and on the third day the left eye had become free from inflammation. At the same time a considerable diminution was noted in the number of amœbæ in the stool. The right eye cleared after two more injections, local treatment was stopped and no further organisms were found in the stool. The exceedingly rapid conquest of this infection, a rapidity which probably will be seldom duplicated in the chronic iritic infections associated with non-dysenteric amœbiasis, argues for a very recent intestinal infection which was eliminated before it established a firm foothold in the colon. Elliott observes that "this very interesting and instructive case should lead tropical physicians to watch their cases of amœbic dysentery with greater care than ever, especially in view of Houdart's case; indeed it may safely be prophesied that similar records will be added to this one before long. We all of us only too often fail to observe what we are not on the lookout for." Had Elliott conceived the extent to which the human race plays host to the RHIZOPODA and had he understood that dysentery is not the essential sign of protozoan infection, his field of prophecy would have been the wide world instead of being limited to the tropics and to cases of amœbic dysentery.

SUMMARY AND CONCLUSIONS.

1. A small but constant proportion of cases of iritis exists, usually of the chronic, recurring, and intractable type, which arise in association with gastro-intestinal symptoms, but in which the exact causative factor has not been found heretofore.

2. Bilateral iritis occurred in the four characteristic cases reported in association with chronic, marked constipation, extreme lassitude, secondary anæmia, low blood pressure, colonic tenderness, and with ENTAMŒBÆ DYSENTERIÆ present in the stools.

3. The sole addition of specific anti-amœbic treatment to the local treatment led to prompt and lasting cure of the iritis and amœbiasis in two of the cases reported, and to prompt symptomatic relief in the two patients still under treatment. Practically every other known form of treatment had been used previously without benefit.

4. The capacity of Protozoa for invading living tissue, both in man and animals, has been recorded indisputably by many observers.

5. Amœbic infection of the human intestine is far more widespread than is generally known, about one tenth of all individuals being affected. The common and incorrect assumption that diarrhœa is the essential sign of such an infection has hindered the earlier recognition of the exact facts. In the temperate zone non-dysenteric amœbiasis is the prevalent form of the infection. Spontaneous cure does not occur.

6. The symptomatology of non-dysenteric amœbiasis is so varied that in all cases of chronic, intractable iritis of uncertain or obscure origin, and especially in those patients who suffer from gastro-intestinal disorders, protozoan and especially amœbic infection must be considered as a possible origin of the ocular disturbance.

7. Iritis arises from amœbiasis by the probable means of amœbic or bacterial emboli which enter the blood-stream through the intestinal lesion, the bacteria coming upon the scene as a secondary infection. It is possible that an additional factor may be the absorption of amœbic or bacterial products by way of the intestinal lesions, especially since the characteristic toxæmia is generally ascribed to this origin.

8. This paper records the first recognized association of iritis and non-dysenteric amœbiasis.

9. The term "Amœbic Iritis" is applied to those cases where the relation between the iritis and the amœbic infection is clearly established. It seems probable that further study of chronic and resistant forms of ocular inflammation will enlarge our knowledge of the rôle played by the intestinal protozoa in their causation. In such an event Amœbic Iritis probably will have become merely a member of the group of Protozoan Irites.

BIBLIOGRAPHY.

1. E. C. Rosenau. *Jour. Infect. Dis.*, 1915, xvii., p. 403.
2. Irons, Brown, and Nadler. *Jour. Infect. Dis.*, 1916, xviii., p. 315.
3. Irons and Brown. *Jour. Amer. Med. Assoc.*, June 10, 1916.
4. Wray. *Medicine*, Oct., 1906.
5. Woods, H. *Ohio State Jour.*, July 15, 1912.
6. Guilbert. *Clin. Ophtal.*, v. xix., 1913, p. 544.
7. Brawley. *Ophthal. Record*, Nov., 1915, p. 568.
8. *Amer. Encyclo. Ophthal.*, vol. vii., p. 5354.
9. Chas. A. Kofoid and Olive Swezy. "The Flagellate Infections of the Human Digestive Tract." Nelson Loose Leaf, *Living Med.*, vol. v., p. 365.
10. John V. Barrow. "The Incidence and Clinical Significance of Flagellate Infection in Certain Chronic Diseases." *California State Jour. Med.*, Oct., 1921.
11. A. C. Reed. *California State Jour. Med.*, Aug., 1922, p. 253.
12. Chas. A. Kofoid and Olive Swezy. *Amer. Jour. Trop. Med.*, vol. i., No. 1, Jan., 1921. "On the Prevalence of Carriers of Entamœba Dysenteriæ among Soldiers Returned from Overseas Service."
13. Manson. *Tropical Diseases*, 1900, p. 325.
14. Chas. A. Kofoid and Olive Swezy. "Mitosis in Entamœba Dysenteriæ in the Bone Marrow in Arthritis Deformans." Univ. California. Pub. in *Zoology*, Apr. 21, 1922, vol. xx., p. 301–307.
15. Kofoid and Swezy. "Amœbiasis of the Bones." *Jour. Amer. Med. Assoc.*, May 27, 1922, v. lxxviii., p. 1602.
16. Kofoid and Swezy. "On the Occurrence of Entamœba Dysenteriæ in the Bone Lesions in Arthritis Deformans."
17. L. W. Ely, A. C. Reed, and H. A. Wyckoff. "The Amœba as the Cause of the Second Great Type of Chronic Arthritis."
18. Würdemann. "Ocular Parasites." *Amer. Encyclop. Ophthal.*, vol. xii., p. 9265.
19. Robert H. Elliott. *Tropical Ophthalmology*, London, 1920.
20. Santos Fernandez. *System of Diseases of the Eye*, vol. iv., p. 712.
21. Houdart. *Proc. Tenth Internat. Congr. Ophthal.*, Lucerne, Sept., 1904.
22. R. Pacheco Luna. *Amer. Jour. Ophthal.*, Sept., 1918, p. 658.
23. Chas. A. Kofoid, Luther Boyers, and Olive Swezy. "Entamœba Dysenteriæ in the Lymph Glands of Man in Hodgkins' Disease." Univ. of California, Pub. in *Zoology*, April 21, 1922, vol. xx., p. 308–312.
24. Dobell. *Intestinal Protozoa of Man.*
25. John V. Barrow. "Intestinal Flagellates: A Plea for Their Pathogenicity." *California State Jour. Med.*, December, 1919.

CHRONIC GONORRHEAL PROSTATITIS, A POSSIBLE ÆTIOLOGICAL FACTOR IN CERTAIN INFLAMMATIONS OF THE EYE—WITH REPORT OF CASES.[1]

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THE occurrence of gonorrheal infections of the conjunctiva, (1), cornea (2), iris (3), and choroid (4), by metastasis has been fairly well established. The investigations of Byers and others tend to show that these eye infections are manifestations of systemic gonorrhea; that they are apt to occur simultaneously with other metastatic inflammations, such as arthritis and endocarditis, and that the gonococci are probably carried into the general circulation by leucocytes which pick them up from the deeper structures of the urethra. Little attention seems to have been given the prostate as a possible focus in such cases, especially in cases occurring long after the subsidence of the urethral symptoms. The *Ophthalmic Year Book*, since its first issue in 1905, has made but one reference to the prostate—this was to a paper by Dernehl (4), published in *Ophthalmology* in 1915, in which he reported three cases of iritis and iridocyclitis who had suffered from gonorrhea from six to twenty years previously and each of whom still showed gram-negative diplococci, similar to gonococci, in his prostatic secretion. The prostate, however, is not mentioned by Norris and Oliver, Fuchs, De Schweinitz, Weeks, nor by any other American textbook on ophthalmology as far as the writer has been able to determine, except for a single reference in *Medical Ophthalmology*, by A. Knapp (p. 263). This is sur-

[1] Read at Section on Ophthalmology, New York Academy of Medicine, May 21, 1923.

prising when we consider the frequency with which the prostate is infected, and that such infections undeniably give rise to metastatic inflammations. Keyes (5), in the last edition of his book on urology, says: "The prostate is implicated in almost every inflammation of the posterior urethra. Prostatitis is by far the most important complication of genital gonorrhea in the male. It is frequent, it is intractable, it is the source of many grave lesions within the prostate itself, and is a port of entry for systemic gonorrhea." Browning (6), discussing gonorrheal iritis in volume xxxii of the *Ophthalmic Review*, says: "The prostate is often infected with gonococci in these cases, and the urine passed after prostatic massage will often show the gonococcus. . . . An examination of the prostate ought to accompany all efforts in the treatment of obstinate, recurring gonorrheal iritis." Hepburn (7), in his recent book, *The Ophthalmology of General Practice*, says: "The causes of iritis are many, but perhaps the commonest is gonorrhea. The gonococci appear to be capable of remaining latent for many years in the recesses of the urethra and the glands connected with it, and may at any time give rise to a recurrent attack."

From numerous observations, both in general practice and in the practice of ophthalmology, the writer also believes that the prostate frequently harbors the gonococcus, sometimes in pure culture, sometimes as a mixed infection, for many years after the subsidence of the initial urethral infection; that because of its position and structure it becomes a focus comparable to a dental, tonsillar, or ethmoidal focus; and that from time to time bacteria are forced into the general circulation from these prostatic foci and produce infections of the eye.

These prostatic infections fulfill the condition that the pus in such foci should be under pressure, as is the case in apical abscesses, ethmoidal cells and in retrotonsillar abscesses. The prostate is a compound racemose gland, abundantly supplied with muscular tissue, and its ducts are easily obliterated by inflammatory processes, leaving isolated pockets filled with a bacteria-laden secretion. These pockets are subjected to great pressure, both by the passage of hard fecal masses over them in cases with constipation, and by the powerful contraction of the muscular fibers of the gland during the act of ejaculation. This tends to force the secretion into the gen-

eral circulation, the bacteria probably not being taken up by leucocytes as is the case in the urethra, for in chronic infections of the prostate the diplococci are seldom intracellular.

In support of the view first expressed, the following cases are offered, the writer is well aware that in none of them is the evidence sufficient to establish an ætiological relation between the prostatic infection and the eye condition described, but he believes that the presumptive evidence is sufficient to warrant their publication for the purpose of emphasizing the importance of a systematic examination of the prostate in such cases.

This presumptive evidence may be summed up as follows:

1. In each of the cases here reported the patient had previously suffered from gonorrheal urethritis followed by a prostatitis of varying duration, and two of these had been under more or less constant treatment for prostatitis since they were first infected.

2. In each case diplococci resembling gonococci were found in the prostatic secretion.

3. In most of the cases the eye lesion closely resembled the type of lesion usually supposed to be produced by gonorrheal infection of the part involved.

4. In each case the removal of all other discoverable foci either failed to bring about recovery, or, if recovery did take place, there was a recurrence.

5. In each case the treatment of the prostatic focus was followed by a disappearance of the eye symptoms after a reasonable period of time.

6. In no case, as far as the writer has been able to determine, has there been a recurrence after the conclusion of the prostatic treatment.

The cases which follow were all patients of Dr. Arnold Knapp, and it is with his kind permission that I am reporting them. The only connection the writer had with any case was to assist in the various investigations, to examine the prostate, and make suggestions as to its treatment.

CASE 1.—C. S. G., aged 49. Diagnosis: Deep marginal keratitis. Was first seen on May 9, 1922. The right eye had then been inflamed for three weeks, and there had

been a similar attack in the left eye six months previously. Vision, right $\frac{20}{70}$; left $\frac{20}{40}$ (with correction). In the right eye there was ciliary congestion, and a number of deeply-placed punctate infiltrates appeared along the margin of the cornea. In the left eye there was a marginal area of fine opacities, vascularized like an old marginal keratitis.

The patient was supposed to have nephritis, and was under treatment for a septic infection of the kidney, but a careful examination failed to substantiate this diagnosis. He had had no other illness except gonorrhea twenty years ago, and had been under treatment for prostatitis ever since. The teeth, nose, and tonsils were negative. His Wassermann was negative. He had some indigestion, but his urine did not contain indican, and he had been on a meat-free diet on account of his supposed nephritis. The urine contained some pus and cylindroids. Examination of the prostate revealed that its lateral lobes were slightly rounded, tense, and somewhat nodular to the touch. They flattened out under massage, and a specimen was easily obtained, which contained diplococci resembling gonococci. He was given urotropin by mouth and gonorrheal vaccine by hypodermic injection, twice a week. Atropin was used locally. After four days the infiltrations at the upper margin of the cornea had healed, though at the lower margin they seemed to have advanced slightly.

June 6, 1922, cornea clear; vision $\frac{20}{20}$. There has been no recurrence.

CASE 2.—J. M., aged 38. Diagnosis: Iridocyclitis. Was first seen on November 23, 1921, when his left eye had been inflamed fourteen weeks without known cause. Vision $\frac{20}{70}$; ciliary congestion, anterior chamber cloudy; posterior corneal deposits present. All tests were negative except his tonsils, which were infected. These were removed, and gradual improvement followed, but on December 27, 1921, there was a relapse from which he slowly recovered, but he did not respond to any definite mode of treatment. On October 11, 1922, he again reported that his left eye had been inflamed for four weeks, coming on apparently after a cold. Wassermann and all other tests were again negative. Vision $\frac{20}{70}$; anterior chamber cloudy; posterior synechiæ. No change in his condition occurred until November 6th, when he became much worse. There were many posterior corneal deposits; his anterior chamber was cloudy; and his vision was reduced to $\frac{1}{200}$. He was again sent to the hospital for a general examination, which was negative, but he now gave a history of having had gonorrhea twenty-five years previously, followed by prostatic trouble. The prostatic

secretion contained many diplococci (some intracellular) as well as many bacilli. Treatment was immediately begun with mixed gonorrheal vaccine, no other treatment being used except atropin locally. In one week his vision had improved from $\frac{1}{200}$ to $\frac{20}{20}-$. He made an uneventful recovery, and there has been no recurrence.

CASE 3.—C. D., aged 44. Diagnosis: Acute choroiditis. Right, was first seen on January 5, 1918, when he gave a history of diminished sight in his right eye for three weeks. At this time his vision was: Right $\frac{20}{70}$; left $\frac{20}{20}-$. The right eye contained vitreous opacities and several round foci of choroiditis, with one patch of choroidal exudate. His Wassermann reaction was negative. He had several infected teeth, which were extracted. He reacted slightly to tuberculin, and was given tuberculin treatments, but his vision became steadily worse, and by March 30th it was reduced to $\frac{1}{200}$. He gave a history of having more or less intestinal disturbance, and his stools were sent to a laboratory for analysis, which showed that they were very acid, highly toxic, and contained indol and skatol in large quantity. Colon irrigations and rectal implantation of colon bacilli were commenced, with at first apparently beneficial results, but his intestinal symptoms never entirely cleared up until the removal of his appendix in 1922. Vision did not become normal in the eye until about one year after the first attack. There were frequent recurrences, the sixth—and last—in January, 1923, when his vitreous became cloudy and his vision reduced to $\frac{20}{70}$, but no new foci could be seen. At this time his genito-urinary history was gone into, and it was learned that he had suffered from a severe case of gonorrhea 30 years ago, followed by posterior urethritis and prostatitis for many years. The right lobe of his prostate was swollen and presented an irregular surface. A large quantity of secretion was expressed, and was found to contain many small bacilli and many groups of diplococci. He was given mixed gonococcus vaccine, and his eye condition steadily improved. By March 23d his vision was $\frac{20}{20}$.

CASE 4.—J. P., aged 35. Diagnosis: Acute iridochoroiditis. Was first seen on December 24, 1919, with acute iritis in the left eye, following an intestinal upset of three days previously. Vision in his left eye was then $\frac{1}{200}$, and no details of the fundus could be made out.

Three years before this he had suffered from choroiditis in his right eye, which had responded to eliminative treatment. A most exhaustive examination at this time, however, failed to reveal any indications of intestinal toxæmia,

and no other focus was found except a chronic prostatitis which followed a gonorrheal urethritis fifteen years previously, and for which he had recently been under treatment. The prostatic secretion contained bacilli and many diplococci resembling the gonococcus. He was given gonococcus vaccine, and a genito-urinary surgeon was consulted, who confirmed the diagnosis of prostatitis but did not think it likely that it was still gonorrheal. In about three weeks his eye condition had cleared up sufficiently to permit a fair view of the fundus. A choroidal patch, some pigmented areas, and a fresh exudate could then be seen. The eye condition slowly cleared up, but did not respond promptly to any mode of treatment. This case is of interest chiefly because there was a definite prostatitis that had been under more or less constant treatment for 15 years, and no other focus was found in spite of repeated examinations by expert consultants.

CASE 5.—I. R., aged 47. Diagnosis: Acute iridochoroiditis. Was first seen on August 17, 1918, with acute choroiditis of ten days' standing in the right eye. Vision in this eye was $\frac{20}{40}-$. There were posterior corneal deposits and in the upper part of his fundus was a large patch of choroidal exudate. An X-ray of his teeth revealed two with apical abscesses. These were extracted. His nasal sinuses and tonsils were negative. His Wassermann and blood chemistry were negative. He had intestinal indigestion, and his urine contained indican, pus, and albumin. A diagnosis of pyelitis and renal calculus had been made, but an X-ray of his kidneys was negative, and his urine became clear after using urotropin for a short time. For his intestinal indigestion he was placed on a meat-free diet, and cultures of the Bulgarian bacillus were given by mouth. In an effort to clear up his eye condition he was also given pilocarpin sweats and mercury rubs. His vision, however, grew steadily worse, and by September 1st it was reduced to $\frac{15}{200}$, and there were many deposits on the anterior capsule of his lens. On September 2d his urine again contained pus, and a genito-urinary surgeon was called, who made a diagnosis of pyelitis. He was again given urinary antiseptics, and his urine slowly cleared up. The eye condition also improved, and by September 30th his vision was $\frac{20}{30}-$, but on October 4th there was another relapse, from which the eye slowly recovered. On July 25, 1919, another attack occurred when the old choroidal patch showed a fresh exudate at its periphery. He was again sent to the hospital, where all tests were negative except that his urine contained pus and indican. The patient had discovered that his urine

only contained indican when he included grapefruit and cheese in his diet. At this time his genito-urinary history was gone into more thoroughly, and it was found that he had suffered from a severe case of gonorrhea 25 years previously, and that this was followed by a posterior urethritis and prostatitis, for which he had been treated from time to time. His prostate was stripped, and the secretion contained numerous diplococci, many of which were intracellular. He was given gonococcus vaccine and referred to a genito-urinary surgeon for prostatic treatment. The condition cleared up promptly, and by October 22d his vision was $\frac{20}{20}$. He was last seen in May, 1923, nearly four years later. His vision was then $\frac{20}{20}$, and there had been no recurrence.

In examining patients for chronic prostatitis, it should be remembered that in many cases no symptoms whatever are complained of, and the patient may be entirely unaware of his condition. Usually a history of chronic urethritis can be obtained, and often a patient will state that for a considerable time after the constant discharge has ceased, a drop or two have appeared when at stool.

Digital examination of the prostate is best made in the following manner: The patient stands, leaning over a table or chair, with his back to the examiner, who is seated. The patient's legs should be widely separated, or he should rest his right foot on the seat of a chair. The examiner wears a finger cot on his right index finger. This is lubricated with vaseline, and is inserted into the anal passage through the inner sphincter. The two lateral lobes of the prostate are within easy reach and can be readily felt on either side of the median line. Normally the prostate is flattened, presents a fairly smooth surface to the examining finger, and is not tender to the touch. In chronic prostatitis the gland is more prominent than normal, though not as greatly distended, nor as tense, as in acute prostatitis. As the finger is swept across the chronically inflamed prostate it may present an uneven, lobulated surface, and is apt to be tender.

In stripping the prostate, it should be massaged with a somewhat circular motion from the periphery toward the median line, where the posterior urethra can be felt. This massage should be kept up until the gland is flattened out (provided there are no concretions or tumor formations), and

until several drops of secretion have been caught on a glass slide held by the patient. Some physicians obtain the specimen by first massaging the prostate, then having the patient urinate in a graduate. The urine is then centrifugated, and the sediment pipetted out, but the writer has never been able to obtain a good specimen in this way; besides, the specimen is more apt to be contaminated by any bacteria that may happen to be present in the urine. Especial care should be exercised in fixing, staining, and washing the specimen, because it seems to contain an oily substance which prevents perfect fixation. In washing out the excess of stain, water should not be permitted to run directly on the specimen but on the edge of the slide only, so that it will flow gently over the specimen. Washing requires several minutes. Specimen should be dried in the air and should not be blotted, for often the entire specimen will cling to the blotter and be lost.

The treatment that has given the best results is the use of gonococcus vaccine and prostatic massage. When a pure culture of diplococci is found, a straight gonococcus vaccine is used; but when there is a mixed infection, a mixed gonococcus vaccine is used. Stock vaccines are usually employed, beginning with a dose of ½*cc* and rapidly increasing the dose to 1 or 1½*cc*, the object being to produce a mild reaction after each injection. Treatments were given twice a week over a period of from four to six weeks.

BIBLIOGRAPHY.

1. KNAPP, H. "Metastatic Gonorrhœal Conjunctivitis." *Arch. of Oph.*, vol. xxix., p. 108.
2. PINCUS. "A Contribution to the Study of Endogenous Corneal Infections." *Arch. of Oph.*, vol. xlviii., p. 136.
3. BYERS, W. G. M. "A Study of the Ocular Manifestations of Systemic Gonorrhœa." *Studies from the Royal Victoria Hospital, Montreal*, vol. ii., No. 2.
4. DERNEHL, P. H. "Chronic Prostatitis, a Probable Factor in Iritis." *Ophthalmology*, vol. ii., p. 519.
5. KEYES, EDW. L., JR. *Urology*, p. 163. D. Appleton & Co., 1917.
6. BROWNING, S. H. *Ophthal. Review*, vol. xxxii., p. 101.
7. HEPBURN, MALCOLM M. *The Ophthalmology of General Practice*, p. 90.

A CONJUNCTIVAL APRON OR SAFETY FLAP IN CATARACT EXTRACTION. A PLEA FOR ITS ADOPTION AS A ROUTINE PROCEDURE.

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(With three illustrations on Text-Plate XXXV.)

ALMOST two centuries have elapsed since Daviel devised and systematically employed the plan of removing a cataract through an incision in the anterior part of the globe. Although his fundamental idea still underlies all present methods, many modifications and advances have been made in the succeeding generations, most of them with the ultimate aim of increasing the likelihood of attaining good visual results. The application of antisepsis and asepsis as well as of local anæsthesia to ophthalmic surgery, needless to say, vastly increased the percentage of successful operations. The judicious use of iridectomy was another valuable contribution. Likewise it may be said of most other modifications in instrumentarium or technic, that it was the aim of their sponsors to obtain satisfactory visual results with a minimum of risk.

To be sure there are men in ophthalmology, as in all other activities of society, to whom the brilliant, the flashy, the hazardous makes a stronger appeal than does the more commonplace, the steady, the secure. These will prefer Smith's operation or Barraquer's phakœresis to the conservative, improved extracapsular methods. Although each method may find its occasional justification under certain conditions and in certain hands, there should be but one determining factor in the choice of operative method to be pursued and

ILLUSTRATING DR. JULIUS WOLFF'S ARTICLE ON, "A CONJUNCTIVAL APRON OR SAFETY FLAP IN CATARACT EXTRACTION."

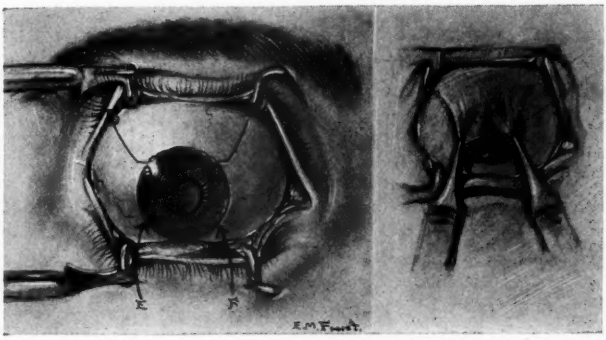


FIG. 1. Showing incisions in conjunctiva, outlining the flap. Insert showing test whether flap is sufficiently freed.

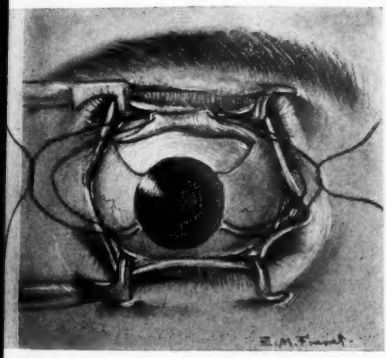


FIG. 2. Showing undermined flap and sutures in place before making the incision with the knife.

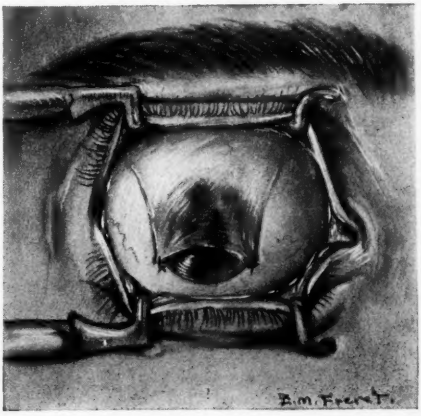


FIG. 3. Showing the flap held in position at end of operation.

that is—the Golden Rule. Let each operator ask himself and honestly answer what choice of method he would prefer if he were the patient; I believe the vast majority would lean towards safety.

It is with this object of increased safety uppermost in mind that another safeguard against complications in cataract extractions was, in course of time, resorted to. I refer to the use of a conjunctival flap of one form or another.

Czermak (1) credits Desmarres with having invented and used a conjunctival flap in 1851. Hasner (2), Schweigger (3) and others followed with methods varying from the conjunctival bridge, which is attached at the cornea as well as above, to the subconjunctival pocket of Czermak and the sliding bridge flap of Kuhnt. Gifford (4) states that in 1901–1902 he used a half purse-string suture to draw the undermined conjunctiva from above over the corneal wound in five cases, but gave up the procedure on account of two infections attributed to the suture. Twelve years later he returned to the use of the sliding flap with gratifying results, using, in the main, Van Lint's method of undermining the conjunctiva upwards from the limbus and drawing it down over the upper fourth of the cornea and holding it in place with a suture on each side of the cornea.

A number of other writers report using the sliding flap, but usually only in special cases in which complications threatened. I believe, however, that I am correct in stating that at the present time the great majority of operators who use the extracapsular methods of extraction, rely on the form of conjunctival flap that is attached to the cornea and is formed by making a peripheral section and carrying the Graefe knife up under the bulbar conjunctiva for some distance after it emerges from the anterior chamber. Unquestionably this form of flap is greatly to be preferred to no flap at all, and it is the method that I was taught and followed for many years.

Referring to the advantages of the corneally attached conjunctival flap Wood (5) states them to be the following:

1. It acts as a covering to the wound, thereby protecting against infection from the conjunctival sac. "*The more complete the covering, therefore, presumably the more effective should it be.*"

2. It prevents prolapse of the iris by the rapid adhesion of the flap to the underlying tissues.

3. It prevents delayed union.

4. According to Herbert it makes secondary glaucoma a rare occurrence, as any separation of the lips of the incision beneath the conjunctiva leads to a filtering cicatrix.

5. As a minor advantage, it enables the lower lip of the wound to be raised to facilitate iridectomy and delivery of the lens.

The disadvantages accompanying the use of this form of flap are stated by Wood to be these:

1. The iridectomy is made more difficult.

2. To obtain a large flap the section must be peripheral, which results in annoying hemorrhage, a very decided nuisance, as it makes all later steps more difficult.

3. It is difficult exactly to outline the flap as one wishes.

4. The peripheral section predisposes to a "separation of the lips of the deep wound."

The third one of these disadvantages is very much aggravated in those cases in which a preliminary iridectomy has been performed, since the cicatricial adhesion of the conjunctiva to the underlying tissues at the seat of the keratome incision is likely to cause a ragged and fragmentary flap.

Being strongly convinced of the above quoted advantages of a conjunctival covering to the section in cataract extractions, and at the same time being desirous to avoid the disadvantages mentioned, I resorted in several complicated cases of cataract, such as dislocation of the lens, cataract in highly myopic eyes or in patients who threatened to act badly, to the use of a sliding flap, employing at first practically the one used by Van Lint and adopted by Gifford. The results were so eminently satisfactory and the security obtained from the use of this method was so decided that I naturally adopted the same course of reasoning as that expressed by Gifford (6) in these words: "The conclusion seemed inevitable that if such a sliding flap were a safeguard, both against vitreous prolapse and against wound infection, *it ought to be employed as a routine measure in all cataract operations.*"

Accordingly, for about one year, I have used in all cataract extractions a modified sliding flap that I have designated as a

"conjunctival apron," or (at the suggestion of Dr. Charles H. May) a "safety flap."

Van Lint's method of making the sliding flap consisted in detaching the conjunctiva from the upper half of the corneal limbus, undermining upwards and laterally, and anchoring the conjunctiva with sutures sufficiently far down to cover the incision and upper part of the cornea.

Whereas this method fairly met the requirements, I found that the coaptation of the lips of the incision was not sufficiently accurate, as the cornea was likely to be pressed somewhat out of shape by the downward traction on the conjunctiva unless an excessive amount of undermining was resorted to laterally as well as upwards. Furthermore the conjunctiva did not lie smoothly but was drawn into broad folds at the sides of the incision. I therefore evolved the following technic for the formation and attachment of the apron or safety flap, and it has proved to be very satisfactory in more than fifty cases operated upon by me and by Dr. Cyril Barnert who employed the method at my suggestion:

TECHNIC OF EXTRACTION WITH USE OF THE SAFETY FLAP.

Just before beginning the operation and after the toilet and anæsthesia of the eye have been completed a few drops of adrenaline are instilled into the conjunctival sac. The most advantageous position for the surgeon while making the flap is at the side of the patient corresponding to the eye to be operated upon.

The first step in the operation consists in outlining the conjunctival flap. For this purpose two points on the corneal limbus are selected which include between them the upper fourth of the limbus (Fig. 1, A and C). From each of these points a small horizontal incision, two millimeters long, is made through the conjunctiva, and from the ends of these small cuts, diverging oblique incisions are made, the one on the nasal side going in a nasal and upward direction and the one on the temporal side in a temporal and upward direction. The object of the short horizontal cuts is to insure a flap of sufficient width that it will cover the whole incision. After having been outlined in this manner the flap included in the

incisions should be undermined superficially, keeping close to the conjunctiva and detaching it from the limbus between the points A and C. The points of anchorage for the flap are then selected and are located where vertical lines from A and C cross the lower limbus (Fig. 1, E and F). To ascertain whether the flap has been sufficiently freed it is caught with two forceps at the points corresponding to A and C and drawn down to the points of anchorage, E and F, as shown in the insert of Fig. 1. The extent of the undermining and length of the lateral incisions should be just sufficient, so that the approximation can be made without much traction and the flap appears to rest comfortably in place.

In order that no time may be lost in anchoring the flap at the end of the operation, when a critical situation may have arisen, the sutures should now be put in place in the following manner: A single-armed fine silk thread of sufficient length (eight inches) is passed from without through the flap, as close as possible to the free edge and at the point that corresponded to A. The point of anchorage for this suture (E) is then grasped with a fine mouse-tooth forceps and the needle passed *through the episcleral tissue* so that this becomes the fixed point down to which the flap will later be drawn. The two ends of the thread are then crossed twice as in the first step of a surgeon's knot, but the loop is left sufficiently slack, so that it can be shoved out of the way of the succeeding steps of the operation. A similar suture is passed at C and through the point of anchorage at F, and also shoved aside as shown in Fig. 2. At the conclusion of the operation first one suture and then the other is knotted, the flap thereby sliding into place, covering the whole incision and from one half to two thirds of the cornea.

In the majority of cases the anterior chamber begins to reform before the bandage is applied, proving the accurate coaptation of the lips of the wound by the uniform but gentle pressure of the flap on the cornea and sclera (Fig. 3).

While the detailed description of this safety flap may give the impression that it is a complicated matter, it is in reality a most simple procedure, and not more than three minutes should be required for fashioning the flap and placing the sutures.

One important instance of superiority of this flap over the regular flap that is attached to the cornea becomes apparent as soon as the incision is being made. Inasmuch as the safety flap has already been formed and the upper limbus is entirely free, the operator can proceed with his section unhampered by the thought that, in order to succeed in getting a flap, he must make his counter-puncture sufficiently peripheral and must place his section peripherally beyond the limbus. He can place his section exactly in the limbus or even in the cornea, and regulate its size according to the nature of the cataract with which he has to deal. He also avoids, thereby, the annoying hemorrhage that is likely to result from the peripherally placed section.

As stated above, it is often a very difficult matter to obtain a large and efficient attached flap where a preliminary iridectomy has been made, while it is no hindrance whatever in making the sliding safety flap which I have described.

The advantages of the attached conjunctival flap manifest themselves only *after the operation is completed*, during the healing process. At the operation itself it is only a nuisance and the more so, the larger it has been made. It renders an accurate iridectomy more difficult to accomplish, it hampers the introduction and withdrawal of the cystotome or capsule forceps and the removal of cortical remnants; in fact it impedes practically all the steps of the operation. Not so with the safety flap. During the operation it is shoved aside and the clearly exposed limbus allows at all times a view of the whole field and permits the greatest accuracy, ease, and expedition in all the manipulations.

If, perchance, vitreous has escaped and the margins of the incision are separated, the old style flap will be of little use in protecting against infection or in closing the wound, while the dimensions of the safety flap and the pressure exerted by it must make it much more efficient in these respects. Fortunately I have not yet had an opportunity to put it to this test.

The removal of the speculum from the eye at the conclusion of an operation is often an anxious moment for the operator if the patient has become excited and nervous, and not a few serious accidents have occurred during this act. With the safety flap anchored in place the speculum can be removed

with the greatest ease and even squeezing by the patient would not result in trouble, as the speculum cannot engage in the wound.

The further value of the safety flap is revealed in the early days of the after-treatment and consists in the rapid, firm and permanent sealing up of the incision. As stated before, the anterior chamber usually begins to reform while the patient is still on the table, and in every one of our cases it was not only present, but generally was very deep at the time of the first dressing. There have been no instances of filtering scars nor delayed union in the cases in which the safety flap has been employed. I believe I can, therefore, confidently state that with a correctly applied flap of the kind here described *the wound does not reopen after the patient leaves the operating table.*

The corollary to this statement is that prolapse of the iris would be very unlikely to occur and that encouragement to the performance of simple extractions would be given by the adoption of this procedure. In fact, one of Dr. Barnert's and four of my cases were simple extractions. My cases obtained central, round pupils, and in Dr. Barnert's case, which is still under treatment, a perfect result is also in view.

Additional safety may also be afforded to intracapsular operations by the flap in question, although I cannot speak from experience on this point.

Bearing in mind the fact that atropine does not dilate the pupil until the anterior chamber is restored after operation, the immediate sealing of the wound by the safety flap causes the atropine effect to take place much more promptly than it would otherwise, a consideration that is of great importance, especially where considerable amounts of cortical fragments remain.

Since employing the safety flap I have observed fewer instances of striped keratitis than formerly, and in those cases in which it made its appearance, it was trifling. This advantage, also, I attribute to the early resumption of its normal shape by the cornea through prompt closure of the wound; as a result restoration of nutrition through the limbus from above is hastened.

The lessened tendency to re-opening of the incision by the employment of the safety flap gives to the patient the advan-

tage that he may be granted greater freedom in turning in bed and lessens the period of confinement to bed. Formerly I kept patients in bed until the fifth day, but since using the safety flap I do not hesitate to give them permission to sit up on the fourth and sometimes on the third day.

As for the behavior of the flap itself, it was at first a matter of surprise to me to find that it showed no tendency to become œdematous or to add to the reaction following the operation of extraction. In a number of the cases the eye, two or three days after the operation, looked practically as it did when the bandage was originally applied. Occasionally the sutures, even though very fine, cause a moderate foreign body sensation but never enough to be a real annoyance.

After three or four days the flap has fulfilled its purpose and by that time it may have started to draw back into place, and one or both of the sutures may have cut through. Generally on the fourth or fifth day, after instilling a drop of cocaine, I remove the sutures; and this process is rendered easier if they have not been knotted too tightly originally, so that one point of a fine pair of scissors can be introduced into the loop. After the sutures have torn through or have been removed, the flap soon draws back into place and by the time the patient is ready to leave the hospital all evidence of the flap has disappeared

I am not in a position to make accurate statistical comparisons of the cataract extractions before and since using the safety flap, but in several respects I feel certain that the course of the after-treatment is much smoother and more satisfactory in the latter cases. Iritis has occurred less frequently and ran a milder course, an experience that can probably be ascribed to lessened likelihood of secondary infection from the conjunctival sac. Striped keratitis, as I have stated above, appears very seldom, and then only in a mild form. There has not been one case in the series in which there was any evidence that the wound failed to be permanently sealed up in the first few hours. Consequently there were no cases of delayed union. The iris in each case kept the position into which it was replaced at the operation and no cases of prolapse occurred; nor did incarceration take place when it was possible to make complete reposition at the time of operation.

The visual results were eminently satisfactory; better, I firmly believe, than they would have been on the average without the use of the safety flap. The number of cases operated upon by this method is, however, too small to be of any value for statistics.

The experiences cited above are derived from a rather limited number of cases, but they suffice to give me a feeling of security in facing cataract extractions far greater than ever before. Any observer who has seen this conjunctival apron smoothly and securely drawn over and supporting the large incision, is likely to share this feeling of confidence. I, therefore, consider the designation "safety flap" a most appropriate one and strongly urge its adoption as a routine procedure in all cases of extraction of senile cataract.

BIBLIOGRAPHY.

1. CZERMAK. *Die Augenärztliche Operationen*, 1904, p. 1068.
2. HASNER. *Wiener mediz. Wochensch.*, 1873, pp. 829–830.
3. SCHWEIGGER. *Arch. f. Augenheil.*, xxxvi., 1897, p. 1.
4. GIFFORD. *Annals of Ophthal.*, 1916, vol. xxv., No. 1, p. 57.
5. WOOD. *A System of Ophthalmic Operations*, vol. ii., p. 1168.
6. GIFFORD. *L. c.*, p. 58.

A NEW OPERATION FOR PTOSIS WITH SHORTENING OF THE LEVATOR AND TARSUS.

By L. DE BLASKOVICS, of Budapest.

(With nine illustrations in the text.)

NOT one of the numerous operations for ptosis produces a completely satisfactory result, owing to the fact that we lack a proper substitute to replace the deficient function of the levator. The methods now prevalent may be divided into two groups: I. The Method of Substitution, whereby elevation of the lid is accomplished by another muscle. II. The Direct Method, whereby an attempt is made to produce a more efficient levator.

No muscle functions similar to the levator. The muscles used for substitution are the frontalis and the superior rectus. Hess's operation may be regarded as the choice of the former type. Here the cicatrical tissue resulting from the attachment of the skin to the lid forms a tendon-like adhesion to the frontalis. Among the newer methods, Esser's may be mentioned. He fixes a tongue of the frontalis to the tarsus.

The common defect of these and many similar operations is: (1) The elevation of this lid is the result of the mechanical pull of scar tissue by the muscle and not due to the function of the muscle per se, or (2) the direction of pull is tangential. If the pull is too great, the closing of the eye may be incomplete, due to the lack of power of the orbicularis in overcoming the pull of the frontalis. Another end-result of the tangential pull is a frequent eversion of the lid.

The substitution of the superior rectus seems to be a better plan, as its direction parallels the levator. Motais's idea was therefore generally approved. In my experience, however,

I cannot recommend it. The few muscle fibers of the superior rectus, sutured into the layers of the lid, can hardly give any satisfactory results. The effect is not even the result of the muscle pull, but due to the fixation of the lid, to the eyeball, in a higher position. The correctness of this observation proves Parinaud's method, who strove only to produce an adhesion between the superior rectus and the inner lid surface, obtaining a similar result. In these cases the lid can be closed only after the stretching of the few muscle fibers of the superior rectus or of the scar between the lid and eyeball. The function of the superior rectus does not correspond to the levator, for during sleep, following these operations, the eyeball is exposed as a result of the eyeball being turned upward; hence corneal suppurations frequently ensue. For the sake of completeness, I mention Darier's operation. He utilizes the orbicularis. If this substitution could produce any results in spite of the muscle's opposition function, it would be the best proof that all of these so-called myoplastic operations act as a result of the muscle pull per se and not in accord with the particular function of the muscle used.

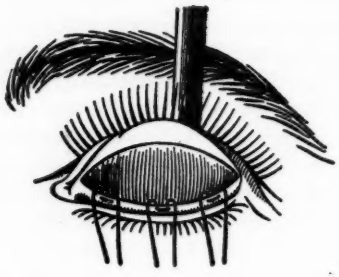
Since no other muscle plays an active part in elevating the lid, the most natural solution would be to seek a direct method to obtain ideal results, the essential factor in this instance being a shortening of the levator. Many authors considered the direct method apparently only in such cases satisfactory where the paralysis of the muscle was not complete. Therefore, the indication for the direct method was chiefly in a paresis of the levator or a ptosis following a paralysis of the sympathetic. The operations of Everbusch, Elschnig, and others proved effective in such cases. In cases of congenital ptosis, however,—chiefly when complicated by epicanthus—the rigidity of the skin plus the narrowed palpebral fissure diminished to a marked degree the effect of the operation, due to a greater force required. In place of the levator in such instances we find merely a layer of connective tissue, interlaced by a few scattered muscle fibers. Similarly, in complete paralysis, when the muscle is inelastic, it is difficult to obtain a sufficient pull, especially as Everbusch does it not only by shortening the levator, but also by folding the tarso-orbital fascia.

Still less effective are operations begun on the inner aspect of the lid, though the levator is here more easily approached and the tarsus shortened. The latter procedure is at least as effective as shortening of the muscle, if we obtain an adhesion between the cut edge of the tarsus and the shortened muscle. From an operative viewpoint, the tarsus may be considered as the rigid continuation of the levator. The shortened tarsus can more easily form a vault upward. Its partial excision is therefore more effective than a similar amount excised from the muscle. Such a type of operation was recommended by H. Wolff, Vicati, Heisrath, Gilet de Grandmont, and Boucheron. However, Wolff shortens only muscle, whereas Vicati, Heisrath, and Gilet de Grandmont narrow merely tarsus. (The last-named author operated from without.) Only the last-mentioned operation can have any result. Boucheron's method seems more effective. He narrows the tarsus and stretches the muscle. However, without muscle resection his results cannot be satisfactory.

Instead of this method, I experimented with an easier one for several years, rendering an account of it at the Sixteenth International Medical Congress of 1909 in Budapest. I shall therefore omit details. Be it sufficient to mention that in the above-cited difficult cases it did not give a satisfactory result. This depended chiefly upon the technique, which I have succeeded in improving to such a degree that it seems worthy of communication, especially so because it is possible, in its present form, to obtain complete results in the most difficult cases of ptosis. The method of the improved operation is as follows:

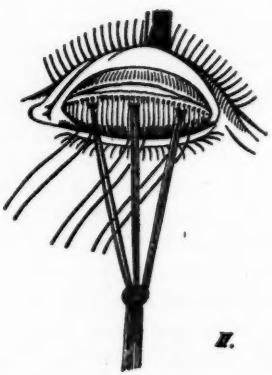
For anæsthesia a *2cc* solution of 2% novocaine containing about *3m* of 1:1000 adrenaline, to be injected in the fornix. The lid is then everted with a Desmarre's lid retractor, as this instrument not only everts the lid but also vaults the levator, arching the fornix upward. In this position an incision is made along the entire length of the fornix, about two to three *mm* from the convex edge of the tarsus. The infiltration of the injection prevents an injury to the levator. If the incision is not too near the tarsus, the wound gapes, exposing the muscle to view. Three double-armed sutures are now placed into the lower lip of conjunctiva, so that the loops appear on the epi-

thelial surface, as shown in Fig. 1. These sutures are gathered into the left hand and gently drawn down, while the conjunctiva is carefully dissected away from the muscle, with the right hand, freeing the entire fornix. This is easily performed without injury to the muscle. Releasing the suture causes the



free margin of the conjunctiva to disappear behind the vaulted muscle, with the six ends hanging loosely.

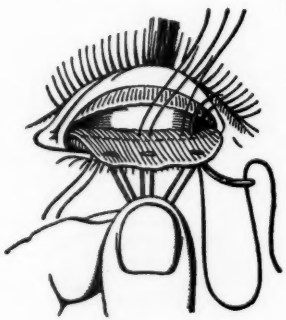
Similarly, three sutures are passed into the muscle, five to six *mm* from the convex edge of the tarsus, each suture including a small bundle of muscle fibers, horizontally placed throughout its entire thickness, as shown in Fig. 2. These serve for



fixation of the muscle only and should immediately be knotted, with their ends tied together, for better manipulation and hold. The muscle is then cut throughout its breadth between

these assisting sutures and the tarsus. The muscle is now drawn down by these sutures, and the surface adjacent to the skin is dissected away with scissors from the pretarsal fascia. Meanwhile, the portion attached to the skin is also cut. This dissection should go deeply into the orbit, so that the muscle can be drawn out to any length. The conjunctival surface of the muscle is now observed to complete the dissection should there be any need of it. By withdrawing and releasing, the elasticity of the muscle is determined, to enable one to judge the proper amount of excision.

The six ends of the conjunctival sutures formerly placed (Fig. 1) are now carried through the muscle in their order immediately behind the site of contemplated resection, as shown in Fig. 3. The muscle is now cut one *mm* in front of

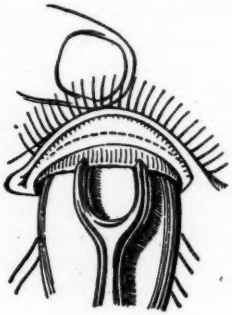


III.

the sutures just passed, taking with it the assisting sutures previously passed into the muscle.

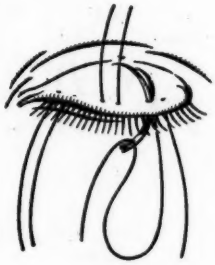
The Desmarre's retractor is now replaced by a spatula placed between the tarsus and the eyeball, the lid is still everted, as shown in Fig 4 A pannus forceps grasps the upper edge of the tarsus and muscle remaining on it and is placed resting on the spatula, so held by an assistant. With the left hand the operator now stretches the free border of the lid as he makes an incision through the tarsus midway between its borders, following the contour of the tarsus, as shown by dotted line in Fig. 4, with his right hand. That portion of

tarsus and muscle to be removed is now cut away with scissors and forceps following the line of incision, leaving the pretarsal



IV.

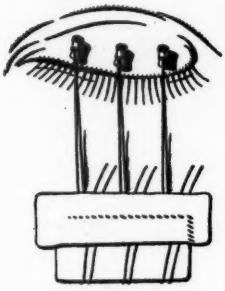
fascia intact. The spatula is then removed, the lid placed in normal position, and the three sutures are now observed hanging out, as shown in Fig. 5.



V.

Having properly arranged the sutures, both ends of the middle suture are carried through the lid from within outward just at the level of the cut tarsal border. This is best performed by drawing the lid down with forceps and passing the needle immediately behind the tarsus and emerging through

the skin. The other two sutures are similarly placed on either side equally distant from the middle suture. If the sutures emerge too high, an ectropion may ensue, whereas placing the sutures too low results in an entropion. The sutures are finally knotted over small gauze cylinders and the ends of the sutures utilized to keep the eye closed. The suture ends are drawn down and fixed on the face with two layers of adhesive so that the first strip sticks to the skin, while the second one fixes the returning threads upon the first, as shown in Fig. 6. This



H.

is done to keep the lids closed while the orbicularis is still under the influence of the injected novocaine, for the combination of a paralyzed orbicularis plus a shortened levator results in lagophthalmos. The operation being now completed, the usual bandage is placed over the eye.

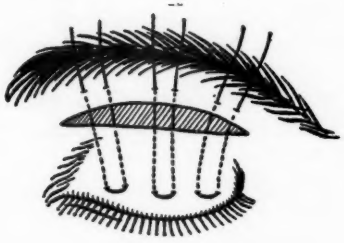
On the following day, the orbicularis having regained its function, the traction sutures are cut, to avoid cutting through the levator by too prolonged a traction. The eye is then re-bandaged or a Fuchs mask substituted. On the day following the operation the success of it is marred by the post-operative œdema. However, from day to day marked improvement is observed. The sutures are removed in six days. At the end of two weeks, the result obtained is similar to that immediately on completion of the operation, excepting that now the closure of the lid is free and easy. Fig. 7 shows the end-result of the operation in cross section.

Complications do not occur during or after the operation. If we succeed in resecting the proper amount of tarsus and muscle, the elevation of the lid is normal in the horizontal position, and the curvature is correct. In cases of paresis and post-inflammatory ptosis (trachoma, conjunctivitis eczematosa) the movement of the lids is normal. In total paralysis, congenital and traumatic ptosis, especially in marked cases, the lid invariably lags when looking up or down. This cannot be otherwise. However comparable with other methods of

substitution, a great difference in results is to be observed. In the most serious cases some movement is seen, though this function be a false one. The pull accomplishes the muscle's work; since the direction of lifting is the correct one. In some instances a blepharo-chalasis-like state resulted, particularly in older patients, where the skin of the lid overlapped the free lid margin. This may be the result of the forward pull of the levator drawing with it the skin. It is, therefore, essential to sever all connections of the levator from the pretarsal fascia. A minor subsequent operation corrects this defect. Originally I excised the fold of offending tissue (three cases), but the results were unsatisfactory. Either the excision was too great, or it was insufficient. I now use a method resembling Hess's operation, taking the precaution not to lift the lid. The skin is incised $\frac{3}{4}$*cm* below the eyebrow and undermined down to the lid margin. Three looped sutures are placed into the contemplated height, usually five to six *mm* from the lid margin running beneath the skin, through the wound and near the eyebrow, passing out through the skin, just below the eyebrow. After the wound is united with a running thread, the three

sutures are knotted over gauze cylinders so as to obtain the desired skin fold, as shown in Fig. 9.

In this operation, as in every ptosis operation, the exact amount of tissue removal is difficult to ascertain. In the description of the methods of muscle and tarsus shortening operations we find variations regarding the degree of shortening. In my opinion, however, these conjectures are incorrect. One *mm* of excision does not produce one *mm* of elevation of the lid, as Wolff states. It is likewise a fallacy to believe that



IX.

one *mm* of excision can result in two or three *mm* of efficiency. In my first communication I committed a similar error. It is impossible to formulate any rule expressed mathematically, as the lid shows a different resistance of lifting power in each case. The muscle, the pull of which we augment with the excision, is a more or less elastic ligament. Continued shortening at first distends it, and finally it overcomes the resistance of the lid. Excisions below this degree are ineffective; then every *mm* of excision increases the effect in increasing proportions, since the muscle becomes more rigid and therefore shows a greater resistance. Rigid skins, narrow palpebral fissures, and deep-set eyes produce a greater resistance. Lax skins, wide palpebral fissures, and exophthalmic eyes show a lesser resistance. The active muscle, due to its greater elasticity, has a greater power than the paralytic muscle. A rigid layer of connective tissue instead of muscle, as at times occurs in congenital ptosis, produces a greater result. As a result of these variations, one can obviously see the fallacy of creating

a general rule. Yet, some method of guidance must be had and in exceptional cases the appropriate changes be made.

Generally speaking in cases of moderate resistance and medium elasticity of the muscle the excision should be five *mm* greater than the desired effect. Should one anticipate an unusually great effect, as in cases of sympathetic paralysis, one should make a smaller excision. Anticipating less resistance or marked extensibility of muscle, we perform a larger excision. Less than 5*mm* of excision produces scarcely any results even in the mildest cases. In cases such as total paralysis with narrowed palpebral fissure, rigid skin, or epicanthus, an attempt must be made to excise as much as can possibly be reached.

In measuring the amount to excise, the tarsus is taken at its widest point and the muscle in the relaxed position. The muscle can only be measured following the excision. If the amount is more or less than the desired result, we make corresponding allowances in excising the strip of tarsus. At its widest point the tarsus measures about 10*mm*, thereby giving sufficient leeway for correction, since two or three *mm* of tarsus are amply sufficient to maintain the normal contour of the lid. It must be mentioned that the small tarsus strip improves the result, for in such cases a higher curvature of the lid margin takes place. Regarding the size of the excision—always muscle plus tarsus—I must mention that in cases of total paralysis sometimes a shortening of 20*mm* was obtainable, with super-effect observed. In cases complicated by an epicanthus, the muscle—or connective tissue in its place—is drawn forward with difficulty; thus it is rarely possible to obtain ten *mm* of excision. In such cases the compensatory narrowing of the tarsus will produce the necessary results.

Owing to the difficulty of estimating the proper amount of tissue to be excised, it may sometimes happen that the result is either under- or over-corrected. The form eroccurred once and the latter instance twice in twenty-one operations. In such cases a second operation is indicated,—naturally several weeks later. If an under-correction results, the excision must be repeated, which is not a difficult task. Diminishing an over-correction is a more complicated procedure. In the above-mentioned cases (paresis, lack of skin, etc.) I proceeded by

passing sutures through the muscle and detaching it from the tarsus and conjunctiva. The incision was made through the conjunctiva. Then proceeding from without, I made a five *mm* bridgelike strip from the pretarsal fascia and sewed its inferior margin to the tarsus and its superior margin to the muscle, as in Fig. 8. The figure of eight sutures was so placed

IIII.

that the knot was tied to the skin. Finally, the wound of skin was united. This operation lengthened the muscle with a fascia-strip. The result was perfect.

In twenty-one operated cases there were five total paralytic ptoses, four pareses—two resulted from eczematous inflammation, two were of traumatic origin,—four of congenital ptosis, and four combined with epicanthus. All produced satisfactory results through the original operation, excepting the three instances mentioned. Therefore, I respectfully submit this procedure for ptosis, basing my judgment upon the results obtained from the above stated cases.

REFERENCES.

1. Hess. *Archiv f. Augenheilk.*, vol. xxviii., p. 22.
2. Esser. *Klinische Monatsbl. f. Augenheilk.*, Nov.–Dec., p. 625.
3. Motais. *Communic. à l'Acad. de Med.*, Angers, 1903.
4. Parinaud. *Annals d'Oc.*, 1897, July.
5. Darier. *Bericht ueber die xxvi. Vers. der Ophthalm. Ges. Heidelberg*, 1887, p. 113.
6. Everbusch. *Monatsbl. f. Augenheilk.*, 1883, p. 100, and 1893, p. 146.
7. Elschnig. *Wiener Med. Wochenschrift*, 1903, p. 51.
8. H. Wolff. *Archiv f. Augenheilk.*, 1896, p. 125.
9. Vicati. *Archiv d'Ophtalmologie*, vol. x., p. 161.
10. Heisrath. *Berliner Klinische Wochenschrift*, 1891.
11. Gilet de Grandmont. *Recuil. d'Opthalm.*, 1891, p. 367.
12. Boucheron. *Archiv d'Ophtalm.*, 1888, p. 229.

IRIDECTOMY IN GLAUCOMA: A NEW TECHNIQUE.

By Dr. ERVIN TOROK, New York.

(With four illustrations in the text.)

IRIDECTOMY is still the classical operation for glaucoma and is the one which is performed in preference to other procedures in all cases where its performance promises success.

There are many theories advanced to explain the mode of action of iridectomy. Most of these are only of historical interest and therefore not enumerated in this paper. The one which is generally accepted is based upon the theory that the maintenance of normal intraocular pressure is accomplished by the aqueous being drained off through the spaces of Fontana by the Schlemm canal, thus having a continuous flow. Pathological examinations of glaucomatous eyes show that the spaces of Fontana in glaucoma are obstructed so that the aqueous cannot be drained. This obstruction may be due to the root of the iris being pressed against the posterior surface of the cornea without being adherent to it, or the root of the iris may be solidly glued to the posterior surface of the cornea by organized plastic exudate. This organized plastic exudate may also entirely fill and obliterate Schlemm's canal.

Now pathological examinations of glaucomatous eyes, where iridectomy was successfully performed, but which were enucleated for some other reason, have shown that the reduction of tension was obtained either by the opening of the passage at the iritic angle for the exit of the fluid or by the formation of a new channel by means of a cystoid scar. Therefore a successful operation for glaucoma must either reëstablish the natural channel of drainage or form a new permanent

[1] Read before the American Ophthalmological Society, Colorado Springs, June 23, 1923.

channel. This according to Elschnig can be obtained by either detaching the root of the iris from the periphery of the cornea or incising it, thereby producing a direct communication between aqueous and Schlemm's canal. The opening between anterior chamber and Schlemm's canal must be large so that a sufficient quantity of aqueous may be drained off through it to maintain normal intraocular pressure. The reëstablishing of this communication can be obtained by a large peripheric iridectomy, by means of which the root of the iris is detached from the cornea and then excised so that it cannot reattach itself again.

This is the universally accepted theory nowadays as to the mode of action of iridectomy in glaucoma. It is self-evident therefore that iridectomy in glaucoma will not be successful if the root of the iris is not detached by reason of faulty technique. These are the cases where a second properly performed iridectomy reduces the tension permanently. It also will be unsuccessful when the root of the iris cannot be detached owing to too firm adhesions. These are the cases where although the iridectomy was performed correctly according to our present technique, the iris tears off anteriorly to the adhesion so that its root remains behind and the iris angle stays obstructed. Finally iridectomy will be a failure even though the root of the iris is detached and excised when Schlemm's canal is obstructed by organized plastic exudate thereby losing its patency.

These latter cases are usually met with in patients suffering from chronic inflammatory glaucoma of long duration especially if they have had one or more acute attacks. Iridectomy is not in order in these cases, but one of the operations which establishes a new channel of drainage such as the Lagrange operation or the trephining.

Now, there is no doubt in my mind that iridectomy is a safer operation than either Lagrange's or Elliot's and therefore preferable to either one. Suffice to mention iridocyclitis and late infections, and I believe that with the exception of the last group mentioned above where Schlemm's canal is not patent, iridectomy, if we succeed in detaching the root of the iris and excising it, will produce a permanent drainage of the intraocular fluid.

As mentioned above iridectomy, as performed according to our present technique, will result in failure in a certain group of cases (where there is firm adhesion between root of iris and cornea) from the iris tearing off at the anterior edge of the adhesion, leaving the root of the iris behind and not establishing communication between aqueous and Schlemm's canal, although the latter is patent. This I attribute to the faulty technique of iridectomy as it is performed to-day. The fault lies in the incision and in the manner in which the iridectomy is performed. Theoretically the incision is to be made *2mm* behind the limbus; that is to say exactly at the junction of cornea and sclera,—it is never made there but always anteriorly to this point. This can easily be ascertained by entering the anterior chamber with an iris spatula after incision and pushing the spatula backward toward the corneoscleral junction, holding it close to the posterior surface of the cornea. The angle where cornea and sclera meet can easily be felt and will be found quite a distance behind the upper lip of the wound. Under such circumstances the incision will either lie in front of the root of the iris or it will go through the adherent portion of the iris, bisecting it. When excising the iris either the entire root, or if bisected, its posterior portion, *i.e.*, the one that blocks the iritic angle, will be left behind.

As far as the iridectomy is concerned the fault in technique can be found partly in the manner in which the iris is grasped with the forceps and partly in the way it is excised with the scissors. The forceps are introduced at right angles to the wound and the iris grasped. The traction exerted upon the iris will be parallel with the horizontal meridian of the cornea and a considerable distance away from its root; it can have no effect in helping to detach the adhesion. Later, when the iris is pulled out, the traction is exerted from the pupillary margin toward the adhesion; traction in this direction will have no effect upon the adherent portion of the iris. Finally, when the iris is excised with the scissors the fold is first cut at the right hand end of the wound; then with a slight traction it is pulled over into the left hand end of the wound where it is excised with the second cut of the scissors. The traction thus exerted will be parallel with the adhesion and therefore will tear the iris off along the anterior edge of

the adhesion, leaving the root behind and the iritic angle blocked.

The root of the iris will be removed by this technique only in cases where the adhesions are very weak and loose, or are not effected by connective tissue but by fresh plastic exudate as in acute attack of glaucoma.

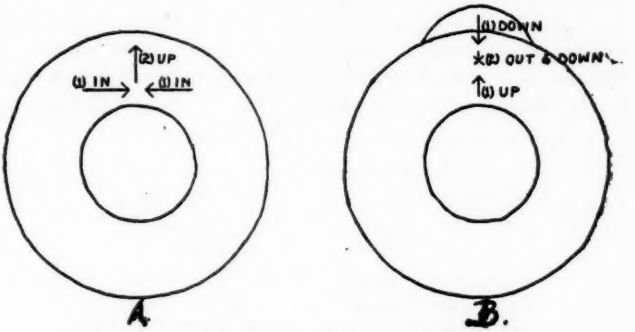


FIG. 1.—Schematic representation of traction in:

A—Present technique; B—New technique.

1. Shows direction in application of forceps. 2. Shows direction of traction in delivery of iris. (Drawn by Dr. G. E. G. Norton.)

These faults in technique may be remedied by:

1. Making the incision with the Graefe knife instead of keratome.

2. Detaching the root of the iris with a spatula before making the iridectomy.

3. Grasping the iris with the iris forceps parallel to the vertical meridian of the cornea.

Following these suggestions an iridectomy on a glaucomatous eye will be performed as follows:

The eyeball is fixed in the limbus at either end of the horizontal meridian of the cornea with a double fixation forceps such as Schweigger's or one similar to it. This will greatly facilitate the section as it will eliminate the rotation of the eyeball, a complication which is most disturbing. The incision is made above, puncture and counter puncture being in the sclera, and the section terminating behind the limbus with a conjunctival flap. It is similar to the one made in Lagrange's

operation but not carried quite as obliquely through the sclera, the cutting edge of the knife having been turned forward when the corneoscleral junction (*2mm* behind the limbus) is reached. If the iris prolapses after incision it should be carefully replaced. The conjunctival flap is now grasped with an anatomical forceps and gently pulled forward making the wound gape thereby. With an iris spatula, holding it always in close contact with the sclera, the root of the iris is detached throughout the whole extent of the wound and if one wishes the spatula can easily be pushed still further forward between ciliary body and sclera as far as the suprachoroidal space. The ciliary

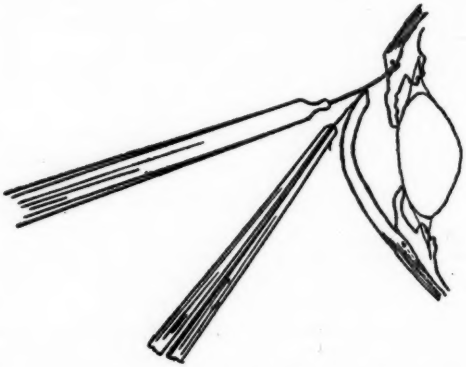


FIG. 2.—Detaching the adherent root of the iris. (Drawn by Dr. G. E. G. Norton.)

body is thereby detached and a cyclodialysis from the anterior chamber performed. If one always keeps the spatula in close contact with the sclera, there is no danger of injuring the ciliary body or losing vitreous.

The assistant now takes the anatomical forceps and keeps the wound gaping by means of traction on the conjunctival flap and the surgeon grasps the iris with the iris forceps. This is done by introducing the forceps parallel with the wound, one blade being placed near the root of the iris, the other one a few millimeters below. The forceps is now closed and the iris drawn out, gentle traction being exerted forward and slightly downward toward the patient's feet and excised with two

sweeps of the scissors. The scissors are held parallel with the wound and placed upon its posterior lip by holding them slightly tilted so that one blade is actually in the anterior chamber. The pillars of the coloboma are now replaced if necessary, the conjunctival flap smoothed out and a bandage applied.

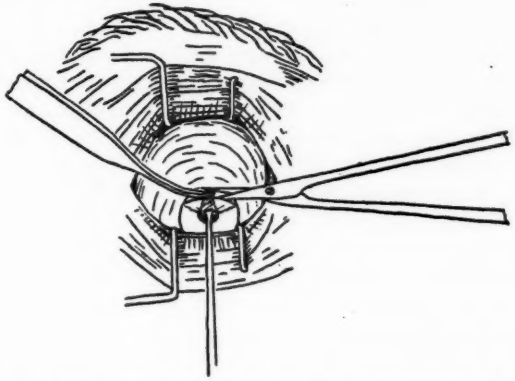


FIG. 3.—Excision of iris; showing application of forceps, delivery of iris and position of scissors. (Drawn by Dr. G. E. G. Norton.)

Now, the advantages of this technique as I see them are as follows:

1. The incision with Graefe knife will give a good, large peripheric incision with a conjunctival flap of any desired size. The knife will be less liable to injure or even bisect the adherent root of the iris and the wound obtained will readily gape, thereby facilitating the subsequent manipulations with the spatula.

2. The detaching of the adherent portion of the iris from the cornea before iridectomy will assure us of opening up the iris angle and reëstablishing communication between aqueous and Schlemm's canal. It is logical to assume that this manipulation will be successful in all cases, with, perhaps, the exception of those of long standing chronic glaucoma where the iris is much atrophied and friable. Under these circumstances the spatula probably will not penetrate between root of the iris and sclera so that no actual detachment will take place—

it will, however, tear the iris and the trabecula of the pectinate ligament, thereby opening up the iritic angle and establishing the desired communication between aqueous and Schlemm's canal similarly to the action of an anterior sclerotomy, with the exception that the subsequent excision of the iris will prevent the closure of the opening thus obtained. This is an important point as it would speak in favor of this method as compared with anterior sclerotomy.

As mentioned above, the spatula may be carried forward between ciliary body and sclera as far as the suprachoroidal space thereby performing a cyclodialysis and opening up the suprachoroidal space also, giving still another channel for the draining off of the intraocular fluid. I mention this with the full knowledge of the fact that pathological examinations have shown that in cyclodialysis the ciliary body does not remain detached from the sclera but becomes firmly adherent to it again, the beneficial effect of this operation being attributed to the opening up of Schlemm's canal rather than to the communication between anterior chamber and suprachoroidal space. Here again, then, the fact that the iris is excised would be a point in favor of this operation as compared with cyclodialysis as no reattachment can occur.

Elliot, speaking about the "new operations for glaucoma" says the following:

"It is admitted that the later the case the worse the prognosis, and that this in part, perhaps in large part, depends on the fact that the advance of the iris, owing to its adhesion to the sclerocornea, makes the attainment of a uvea-free fistula more difficult and more hazardous." If this be so, then it would seem to me that detachment of the root of the iris before iridectomy in trephining, as well as Lagrange's operation would be to a great advantage and would give us a permanent fistulous opening in a greater number of cases. The manipulations with the iris spatula can easily be performed through the trephine opening and also through the wound.

3. The technique of the excision of the iris together with detaching it from the sclera will secure the opening of the iritic angle by removing the root. To grasp the iris parallel with the vertical meridian of the cornea and draw it out with gentle traction forward and slightly downward will tend to pull the

iris away from the sclerocorneal junction and bring its root within the action of the blades of the scissors. This is still further facilitated by holding the scissors slightly tilted. The previous detachment of the adhesion will absolutely eliminate the possibility of tearing off or cutting off of the iris along its anterior attachment to the cornea and sclera.

I have so far performed this operation within the past year and a half on twenty-seven eyes, and the results obtained are quite satisfactory. Of course, time is too short and material too limited to draw any conclusions from them. The operation, however, seems logical to me and the result so far encouraging enough to warrant its publication and recommendation to the medical profession. The technique does not present any special difficulties or any special dangers.

INFLAMMATORY PSEUDOTUMOR OF THE ORBIT.[1]

By Dr. WILLIAM L. BENEDICT and Dr. MARY S. KNIGHT,

Section on Ophthalmology, Mayo Clinic, Rochester, Minnesota.

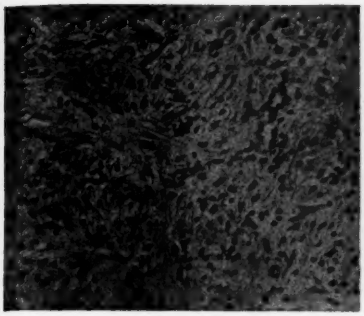
(*With ten illustrations on Text-Plates* XXXVI *and* XXXVII.)

INFLAMMATORY pseudotumor of the orbit is a rare clinical condition which in most instances cannot satisfactorily be diagnosed without microscopic examination of the tissue involved. The condition is characterized by disturbance of motility of the eyes, proptosis usually with lateral displacement of the eye in the affected orbit, swelling of the lids and increase in the bulk of retrobulbar tissue. As the quantity of tissue in the depth of the orbit increases, the eye becomes rather firmly imbedded, so that it cannot be pressed backward. The onset is slow, and not accompanied by the usual symptoms of inflammation.

That the swelling of the orbital tissue and the consequent proptosis are inflammatory, is borne out by the microscopic appearance of the tissue rather than by symptoms and complaints of the patient, or the gross appearance of the mass at removal. Birch-Hirschfeld drew attention to the inflammatory character of the tissue, and suggested an infectious origin of the disease; his opinion is in harmony with the subsequent observations of Stargardt. The finding of focal infection elsewhere in the body preceding or accompanying the signs of orbital tumor, also makes the infectious character of the condition seem probable. Such focal infections usually

[1] Read before the New York State Medical Society, New York City, May, 1923.

ILLUSTRATING DRS. BENEDICT AND KNIGHT'S ARTICLE ON "INFLAMMATORY PSEUDOTUMOR OF THE ORBIT."



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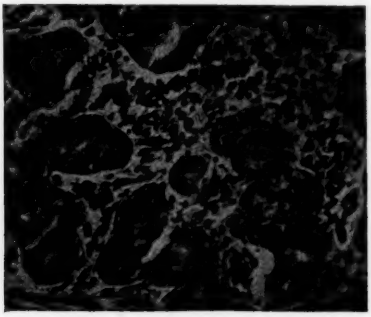

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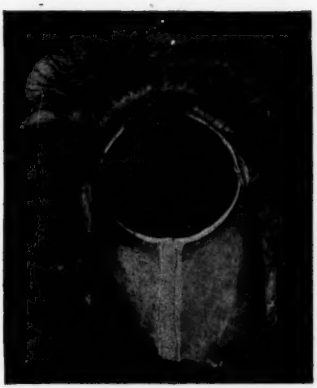

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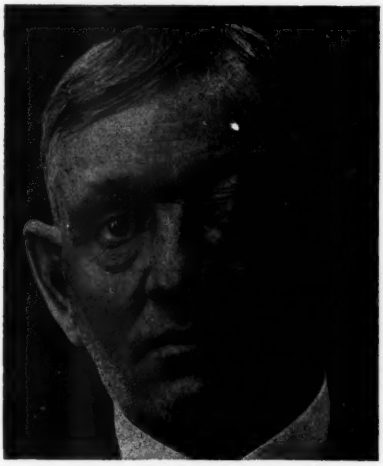
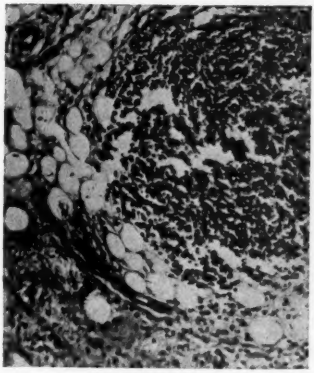


FIG. 4.

ILLUSTRATING DRS. BENEDICT AND KNIGHT'S ARTICLE ON "INFLAMMATORY PSEUDOTUMOR OF THE ORBIT."



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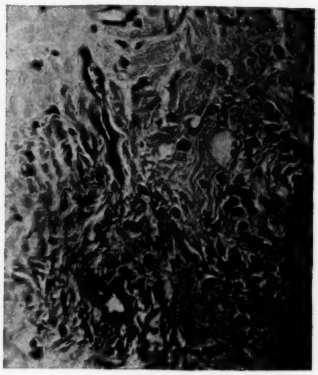

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FIG. 8.

FIG. 9.

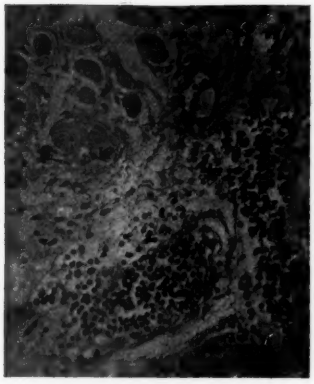

FIG. 10.

do not cause symptoms, and are either overlooked or disregarded as ætiologic factors in the production of the orbital swelling. The patient usually is not suffering from the infections, and the absence of fever, high leukocyte count, and local pain, serve to differentiate pseudotumor from the common inflammatory processes within the orbit. In all cases reported, the syndrome of benign or malignant tumor was present. Under the administration of drugs certain suspected neoplasms disappeared, although specific action of the drug used could not acceptably be ascribed except in cases believed to be due to syphilis or tuberculosis. Other cases of suspected neoplasm of the orbit have come to operation without a tumor being found; in still others masses have been found in the orbit, which on microscopic examination proved to be inflammatory and without characteristics of neoplastic formation.

Birch-Hirschfeld's classification of pseudotumors has been followed by most writers in reporting such cases; we also shall adhere to this classification in the consideration of our cases. The grouping of inflammatory pseudotumor of the orbit is as follows

Group 1. Cases in which the syndrome of benign or malignant neoplasms is presented clinically, but in which recovery is spontaneous, or on administration of drugs, such as potassium iodide, mercury, and quinine.

Group 2. Cases in which the diagnosis of orbital tumor is made on the clinical picture, but the tumor is not found when the orbit is opened.

Group 3. Cases in which a tumor is diagnosed at operation, but on microscopic examination is found to consist of chronic inflammatory tissue.

Since the publication of Birch-Hirschfeld's review of the subject, we have been able to find reports in the literature of only five cases of pseudotumor of the orbit. None of these reports was printed in the English language. This would lead us to believe that inflammatory pseudotumor of the orbit is a very rare condition, yet its clinical significance cannot be disregarded, as six cases have come under our observation within the past three years. The paucity of published reports of well studied cases justifies the recording of these cases in

detail. Three of the six cases belong to the second group, and three to the third group of Birch-Hirschfeld's classification.

Group 2. CASE I (A338840), Mrs. J. H., aged forty-seven years, came to the Clinic, October 25, 1920, because of protrusion of the right eye, with swelling around and particularly below the eye of three months' duration. The patient, feeling that her teeth were the cause, against the advice of her dentist, had some bridge work removed and teeth extracted. The following day she had severe pain in the right temple; the swelling increased and the eye protruded. The pain was almost constant for a time and was relieved only by narcotics, but when she was seen at the Clinic ten days later, the pain had largely subsided.

On examination there was marked proptosis of the right eye with drooping and œdema of the upper lid, the most prominent swelling being at the upper inner angle of the orbit. The eye was divergent and there was limitation of movement in all directions, more marked upward and inward. The pupil reacted rather sluggishly to direct light, more promptly to consensual light. The fundus was negative except for slight pallor of the temporal half of the disk. Examination of the left eye was negative. Vision was $\frac{5}{10}$ right eye, and $\frac{6}{6}$ left eye. Examinations of the urine, and the Wassermann reaction were negative. The leukocyte count was 8,200; a differential count was not made. The tonsils and nasal accessory sinuses were normal. A roentgenogram of the head revealed bony changes around the right orbit and the right parietal region of the calvarium, indicating destruction and repair of the bone in the region involved. A careful neurologic examination was negative, except for some small sensory changes on the right side of the face, the ptosis, and disturbances of the ocular muscles. The patient gave a history of migraine which made it difficult to judge whether the pain was due to the condition within the orbit.

A diagnosis of orbital tumor was made and the orbit explored through an incision in the brow. No mass could be palpated in any part of the orbit. The wound was closed without removing any tissue, and it was noted that the degree of exophthalmos had not been changed by the operative interference. The wound healed promptly and the patient was dismissed three weeks after the operation. At this time the proptosis had receded somewhat and it was hoped that it would continue. However, the patient still complained of the pain.

Two months later a letter was received from the physician

the patient consulted after leaving the Clinic, stating that the proptosis and pain had increased. Orbital cellulitis had been suspected and the eye was removed. No tumor was found in the orbit behind the globe and the enucleation did not relieve the pain nor explain the proptosis.

CASE 2 (A308271), F. P., a girl, aged seven years, was brought to the Clinic, March 6, 1920, because of protrusion of the right eye. She had been well until five weeks before, when she came home from school with slight swelling of the right lower lid, which steadily grew worse and spread to the upper lid. There was no definite history of injury. Within a few days after the onset of the swelling the chemotic conjunctiva protruded between the lids, the eye was red and proptosed, but the cornea was clear and vision unaffected. Three operations, the nature of which was not known, were performed elsewhere within four weeks, with no relief. There was slight pain in the eye when the swelling first started, but later the pain was severe in the head, side, and arm. The child had lost weight, but her appetite was good; she had not vomited.

At the first examination, made five weeks after the onset of the swelling, there was marked exophthalmos of the right eye and some swelling in the right temporal region. The lower lid was hidden by the chemosis of the lower ocular and palpebral conjunctiva, which projected between the lids. The upper lid overhung the upper two-thirds of the proptosed globe, but the lower third of the cornea was exposed and ulcerated. There was no œdema of the left lids and the left eye appeared to be normal. The right side of the soft palate was swollen slightly. The temperature was 100.2°, the pulse 140. The erythrocytes numbered 4,150,000, leukocytes 9,600, polymorphonuclear lymphocytes 71.5, small lymphocytes 22.5, large lymphocytes 5.5, and basophils 0.5. A roentgenogram of the head was negative, the blood count was normal, and except that the patient was weak and drowsy, an examination of her general condition was negative. The cornea had sloughed badly and was on the verge of rupturing. The swelling was thought to be due to tumor, and immediate removal of the eye and tumor was advised.

General anæsthesia was used for the enucleation. The ocular conjunctiva below was much thickened, apparently infiltrated with tumor, and was freed from the eyeball with difficulty. The globe was adherent to Tenon's capsule, and when freed was found to lie in a shallow socket of tumor tissue which filled the orbit. The orbit was thoroughly exenterated, and the upper lid, which was infiltrated, was

removed. The bony walls were intact; the tumor was apparently primary in the orbit. Recovery was uneventful. The patient was well two years later.

Microscopic sections, largely of young connective tissue, were taken from several parts of the tumor; lymphoid and polymorphonuclear cells were found scattered throughout. In one section small groups of fat cells were surrounded by the leukocytes; in other sections were muscle fibers in which the striations were well preserved, although there was much infiltration around the bundles (Fig. 1). A part of the lacrymal gland was also sectioned. Some of the secreting cells showed degenerative changes, and other acini had completely disintegrated leaving only fragmented cells. The stroma of the gland was generously infiltrated with lymphocytes (Fig. 2).

CASE 3 (A420388), Mrs. A. P., aged sixty-four years, came to the Clinic, March 15, 1923, five weeks after the left orbit had been exenterated elsewhere. For three months before the operation the patient had noticed diplopia when looking to the left. About one month before, a sudden sharp, shooting pain marked the onset of proptosis of the left eye. Soon after this both lids became deeply discolored and a serous bloody discharge appeared in the cul-de-sac. The patient was taken to the hospital and the orbit exenterated three days later.

Examination revealed the right eye to be normal. The left orbit was clean, and filling in with healthy granulations. Examination of the nose and throat was negative, but a roentgenogram of the accessory sinuses disclosed clouding of the left antrum and both frontal sinuses. The general examination was negative except for chronic myocarditis and constipation.

The pathologic report from the laboratory where the operative specimen was examined read as follows: "Sections through various portions of extra-orbital tissue show a great deal of extravasation of blood into the tissue substance, and a diffuse round-cell infiltration of an inflammatory character. In some portions there are islands of cells which look like epithelium and have the appearance of a metastatic epithelioma."

The two sections of tissue which were loaned to us for examination, revealed only hemorrhagic and leukocytic infiltration, which consisted largely of polymorphonuclear forms. The sections contained fat and striated muscle. The muscle fibers had not lost their striations, but there was much hemorrhagic and leukocytic infiltration among them. However, the infiltration was most dense around

the blood vessels. Here there were also numerous endothelial cells which may have been mistaken for "metastatic epithelioma" (Fig. 3).

Group 3. CASE 4 (A406278), W. H. D., a man aged fifty-three years, came to the Clinic, September 29, 1922, complaining of protrusion of the left eye which had persisted for three months. The proptosis had appeared suddenly, reached its height in two months, and had remained stationary. Diplopia also developed. The lower lid became swollen, and uncontrollable drooping of the upper lid developed. Pain occurred at intervals, but was never severe. The previous winter a bilateral epiphora had been troublesome, and the ducts were probed. Two weeks after the onset of the proptosis in the left eye, an acute dacryocystitis developed in the right lacrymal sac, ruptured and cleared up. There was no history of other eye trouble. Six weeks before coming to the Clinic the patient had had an operation on the nose to clean up sinuses which were thought to be the cause of the proptosis (Fig. 4).

On examination the right eye appeared to be normal. Vision of the right eye was $\frac{6}{6}$, of left eye $\frac{1}{6}$. The left upper lid covered the globe, and was swollen and œdematous. The lower lid also was thick and swollen. The larger vessels of the conjunctiva were tortuous and injected. The cornea was clear; the anterior chamber was normal in depth, and the pupil reacted promptly. The eye diverged, was depressed 0.5*cm*, and could not converge. Motion was limited, and diplopia was present in all directions. There was no visible lesion of the fundus. Exophthalmometer readings were right eye 15, left eye 28. The lower margin of the orbit was barely palpable, and was encroached on by a spongy mass which was either thickened lid or neoplasm. A small mass just behind the upper inner orbital margin could be palpated. In an examination of the blood 5,300 leukocytes were counted. The differential blood count was lymphocytes 21.5 per cent., large mononuclears 4.0 per cent., transitionals 3.5 per cent., neutrophils 70 per cent, eosinophils 0.5 per cent., and basophils 0.5 per cent. A serum Wassermann reaction was negative. The patient gave a history of recurrent vertigo and intermittent chills and sweats of many years' duration, the cause of which was not determined. Except for atrophy of the right middle turbinate, the nose and throat examination was negative, but roentgenograms showed that both antrums were very cloudy. Examination by the neurologists did not disclose evidence of a brain tumor or of extension of the tumor from the orbit. A diagnosis of malignancy in the orbit was made,

and the removal of the tumor, or exenteration of the orbit if necessary, was advised.

October 4th, an incision was made through the left brow, and the superior and nasal periorbita were elevated. The palpating finger found a large firm tumor which extended from the globe to the apex and completely filled the posterior half of the orbit. As it was impossible to remove the tumor alone the orbit was exenterated (Fig. 5).

The patient recovered uneventfully, and a week later went to his home where the family physician cared for the wound. He returned for observation two months later. The orbit was filling rapidly with granulations, the surface was clean, and partially epithelialized.

Examination of the tissue removed which included the lids, globe, and tumor, showed that the tumor was firm, white, conical in shape, and with its base firmly attached to the globe behind the equator. The optic nerve and the muscle cone were involved in the tumor which apparently had replaced the orbital fat. The periphery was more dense and fibrous than the central portion. The area within the muscle cone around the optic nerve was white and stippled with round, translucent yellowish areas 1 to *2mm* in diameter. Microscopically the periphery consisted largely of dense fibrous connective tissue. The collagen fibers were large, abundant, and almost hyaline in appearance. Scattered liberally throughout this tissue were plasma cells and lymphocytes. Occasional small groups of fat cells were seen surrounded by numerous infiltrating cells, and thin walled blood vessels. Near the center of the section the mass contained more fat and numerous young fibroblasts, and the connective tissue was less dense than at the periphery. For the most part, the lymphocytes were collected into groups resembling follicles, and the plasma cells were scattered throughout the tissue between (Figs. 6 and 7). The size and distribution of these groups corresponded to the translucent dots seen in the center of the gross specimen. The extrinsic muscles were diffusely infiltrated with lymphoid cells, and practically all the small vessels showed endarteritic changes. In some instances these changes had progressed to obliteration. Except for scattered areas of lymphoid infiltration in the choroid, the globe itself was not significantly changed.

Case 5 (A403390), Miss E. T., aged thirty-five years, came to the Clinic, August 30, 1922, because of swelling of the lids of the left eye. The left upper lid had swollen nine months before; this subsided completely within three weeks, and there was no more trouble except one or two slight

recurrences until ten days before her examination, when the left lids became markedly swollen and diplopia appeared.

On examination the right eye was found to be normal. The left eye was 4 to 5*mm* lower than the right. The left upper lid dropped and was œdematous. On palpation a soft fluctuant mass was felt extending from the inner canthus to the outer margin. There was some fullness of the lower lid and the ocular conjunctiva was thrown into folds at the outer canthus. There was no apparent limitation of movement of the eye, but diplopia was elicited on extreme elevation. The external examination of the globe was negative. Exophthalmometer reading of the right eye was 17, of left eye 23. There was no lesion in the fundus (Figs. 8 and 9). The patient had an adenomatous thyroid which was producing no symptoms. She gave a history of glycosuria accompanying the first attacks of swelling but on general diet not even a trace of sugar was found during the six days she was under observation in the hospital. No differential white count was recorded. The erythrocytes numbered 4,680,000, the leukocytes 10,500.

A diagnosis of orbital tumor was made and removal advised. An incision was made in the brow and the periorbita incised at the orbital margin. Immediately beneath it lay a soft, white, friable, not encapsulated mass 1.5*cm* by 1*cm* which was removed. The wound healed promptly and the patient was dismissed from observation a week after the operation. Six months later she sent a recent photograph; there was no swelling, and only slight ptosis.

The microscopic section was very cellular. Lymphocytes predominated but eosinophiles were conspicuous and there were also endothelial leukocytes. The wandering cells were not uniformly distributed, although they were present throughout the section, but were concentrated into fairly large groups between which were seen areas of young fibroblasts. Small groups of isolated fat cells were seen where the process had invaded fatty tissue.

Case 6 (A396255), Mrs. J. G. S., aged forty-four years, came to the Clinic in June, 1922, because of exophthalmic goiter. The left superior thyroid vessels were ligated and two weeks later the gland was resected. There was no record of any eye symptoms at that time. In January, 1923, the patient returned complaining of inability to raise the eyelids. This difficulty had appeared one week before, and diplopia, on looking upward, was noticed soon afterward.

On examination the right eye appeared a little more prominent than the left. Both upper lids were somewhat puffy but not discolored. The bulbar conjunctiva on the

temporal side of the right eye was slightly chemotic. The lateral movements of the eyes were good, but they could not be elevated above the horizontal plane. Otherwise the eyes were normal. The diagnosis of conjugate paralysis was made and observation advised.

The patient returned to the Clinic in April. At that time a soft mass could be palpated in the upper inner quadrant of the right orbit. Proptosis and exophthalmos of the right eye were marked. In the primary position the right eye was turned down and out. External ocular movements were normal except elevation. Binocular attempts to elevate showed a moderate amount of elevation of the left eye in all fields. The right eye moved up very slightly in the field of the inferior oblique. Exophthalmometer readings were right eye 23, left eye 17. The patient returned again in two weeks, saying that the tumor was growing and the vision of the right eye rapidly failing. The general appearance of the eye had not changed, but the patient complained of shortness of breath and was quite nervous. Examination by the neurologist revealed only paralysis of associated ocular movements. Examination of the urine and the Wassermann reaction were negative. The erythrocytes numbered 4,600,000, the leukocytes 8,000. No differential blood count was made. In view of the patient's general symptoms and anxiety it was deemed best to remove the tumor at once.

An incision was made just below the brow and the periorbita incised between the superior and internal rectus muscles. A fairly large soft tumor was felt extending along the line of the internal rectus muscle. It was dissected free, excised at the apex, and the wound closed. Recovery was uneventful.

The operative specimen was a rounded, flattened, pinkish, fairly firm mass, measuring 20*mm* in diameter and 6*mm* in thickness. One side was covered by a thin glistening fibrous capsule and some loose fatty tags were attached to it. The other side seemed to have been cut, and frayed ends of muscle fibers projected from the surface.

The microscopic sections were made up largely of degenerating muscle, and fat tissue. The fiber bundles stained poorly, and some were vacuolated. The section gave the impression that a certain number of bundles were shrunken and smaller in diameter, and others had completely disappeared leaving blank spaces. The tissue was infiltrated with lymphocytes which tended to collect around the blood vessels. There were also a smaller number of plasma cells and endothelial leukocytes. There were no signs of malignancy nor of an acute inflammatory process (Fig. 10).

DISCUSSION.

In none of these cases was the clinical course of long duration. In the majority, symptoms appeared about three months before they became severe enough to cause the patient to seek medical advice. In one case (Case 5) swelling of the lids had occurred nine months before, but soon subsided and the onset of the real attack occurred only ten days before the patient's first visit to the Clinic. This agrees well with other cases reported in which the duration of symptoms was from ten days to one year.

The disease was sudden in onset, or there was exacerbation of symptoms in most of the cases. In several the symptoms began insidiously and fluctuated for some time, then became severe and constant. In two of the cases (Cases 2 and 4) there was no prodromal period.

The ætiology of the condition is not known. Marbaix and Van Duyse insist that the orbital neoplasm is only one expression of a general systemic disease in which lymphocytosis is a constant finding, and that the blood count will aid materially in the diagnosis. This was not true in the cases here reported. The two instances in which the differential white count was recorded, showed no evidence of lymphocytosis.

Lafon suggests recurrent hemorrhage of unknown origin as a cause. At first these are absorbed, but finally organization and proliferation of the orbital connective tissue forms a fibromatous pseudotumor. Case 3 may belong to this class; at least the sudden onset quickly followed by discoloration of the lids and bloody serous discharge, and the pathologic picture seem to point to hemorrhage.

Practically all the writers on the subject refer to infection as a direct ætiologic factor, and this theory seems to fit the facts in several of our cases. In Case 1 the orbital swelling seemed to be associated with dental infection and a marked exacerbation immediately following the opening of this focus by extracting the teeth. The patient in Case 4 had been treated for six months for bilateral chronic purulent dacryocystitis, and roentgenograms also disclosed clouding of both antrums. Birch-Hirschfeld gives a full description of the classical patho-

logic picture of pseudotumor of the orbit, to which Case 4 corresponds. The orbital tissue studded with groups of lymphocytes resembling follicles with an outer ring of plasma cells, the endarteritic changes, and the absence of all signs of malignant growths, form the characteristic picture. Case 6 also corresponds fairly closely to this description. Marked exophthalmos had persisted longest in these two cases, approximately three months. The pathologic picture in the other three cases studied varied considerably. In Case 2 in which several attempts had been made to drain a supposed abscess, the picture was greatly altered by the secondary infection. Hemorrhage was a complication in Case 3; there were also evidences of an acute rather than a chronic inflammatory process (many polymorphonuclear leukocytes). Sections from tissue in Case 5 showed the follicular arrangement of the lymphocytes, but the plasma cells were absent and eosinophils were conspicuous. The absence of plasma cells speaks for a shorter duration of the process, and in these last three cases marked symptoms had persisted only a relatively short time (three days to five weeks). This would lead one to the conclusion that the pathologic picture depends in no small part on the age of the lesion, and that these atypical types are only younger pseudotumors.

BIBLIOGRAPHY.

1. Birch-Hirschfeld, A. "Die Krankheiten der Orbita." *Graefe-Saemisch Handbuch*, II. ed., 1910, ix, pt. 1, 501.
2. Huber, O. "Ein Fall von entzündlichem Pseudotumor der Orbita." *Klin. Monatsbl. f. Augenh.*, 1920, lxv., 718–723.
3. Jackson, E. "Pseudotumor of the Orbit." *An. d. oftal.*, 1905, vii., 89–100.
4. Lafon, C. "Pseudo-tumeur de l'orbite consecutive à des hemorragies recidivantes spontanées." *Bull. et. mem. Soc. franç. d'opht.*, 1908, xxv., 502–508.
5. Marbaix and Van Duyse. "Pseudoblastoma of the orbit: pseudoleukemic lymphomatosis (lymphocytemia)." *Arch. d'opht.*, 1921, xxxviii., 466.
6. Ringel, T. "Tumors, pseudotumors and foreign bodies of the orbit." *Beitr. z. klin. Chir.*, 1922, cxxvi., 239–247.
7. Stargardt. "Doppelseitiger entzuendlicher Pseudotumor der Orbita." *Klin. Monatsbl. f. Augenh.*, 1921, lxvii., 107–108.

LEGENDS.

Fig. 1 (A308271). Secondary polymorphonuclear leukocytic infiltration, (probably due to the operative interference) of the new formed connective tissue. X200.

Fig. 2 (A308271). Lymphocytic infiltration of the lacrymal gland. X200.

Fig. 3 (A420388). Infiltration of muscle fibers with hemorrhage and concentration of the leukocytic infiltration near the blood vessels. X200.

Fig. 4 (A406278). Patient when first seen.

Fig. 5 (A406278). Longitudinal section of gross specimen.

Fig. 6 (A406278). Follicular arrangement of the lymphocytes in the central portion of the tumor mass near the optic nerve. X100.

Fig. 7 (A406278). Denser peripheral portion of mass consisting of fibrous tissue with infiltration of plasma cells. X200.

Fig. 8 (A403380). Before operation.

Fig. 9 (A403380). Six months after operation.

Fig. 10 (A396255). Degenerating muscle fiber bundles. Follicular arrangement of lymphocytes with peripheral sprinkling of plasma cells. X200.

REPORT OF THE PROCEEDINGS OF THE SECTION ON OPHTHALMOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

By Dr. BEN WITT KEY, Secretary.

MEETING OF MARCH 19, 1923. DR. ELLICE M. ALGER, CHAIRMAN.

Dr. GEORGE H. BELL presented a patient, aged 30 years, having a non-magnetic **foreign body** in the globe of the right eye. When first seen two months before there was a hole in the iris, dislocated lens and plastic exudate in the anterior chamber. X-ray at three different times revealed a foreign body, *1mm* x *1mm*, just back of the iris. Three attempts to dislodge the foreign body with the magnet had failed. Dr. Bell requested a discussion as to the proper procedure in the case, since the plastic exudate had persisted, although tension was normal and vision equaled hand movements. He had advertised enucleation which the patient refused.

DISCUSSION: Dr. A. E. DAVIS suggested enucleation.

Dr. J. B. SMITH proposed iridectomy. He had had a similar case in which the foreign body was attached to the iris or capsule. With iridectomy the foreign body was removed and the result satisfactory. He regarded this as a possibility before resorting to enucleation.

Dr. C. E. MCDANNALD suggested palliative measures and observation until acute or more definite symptoms should indicate enucleation.

Dr. BELL in closing stated that he thought it unwise to perform iridectomy and attempt removal of the foreign body because of the low-grade infection and the plastic exudate remaining in the anterior chamber.

Dr. D. SMITH presented a case of multilocular **cyst of the**

iris in a boy, aged 7 yrs. Foreign body (steel), 4 x 1*mm*, had penetrated the globe, which was removed by the posterior route. Traumatic cataract absorbed. Four months after the injury a large multilocular cyst filled the anterior chamber. Before operation could be performed he was struck in the eye by a base-ball, from which there was considerable reaction, and hypertension developed. Iridectomy, evacuation and removal of the cyst through the original wound was then performed. Several months afterwards the cyst returned, as demonstrated in detail by transillumination. Tension of the eye was normal and projection good. Dr. Smith questioned the form of procedure now indicated.

Dr. T. B. HOLLOWAY read a paper pertaining to **refraction from a scientific standpoint.** He also exhibited a demonstration eye, of service in demonstrating the various principals of optics as well as the various errors of refraction.

A paper entitled **"Applied Refraction—The Art"** was read by Dr. A. E. DAVIS.

In dealing with the methods of testing and adjusting glasses to the eyes, the question of the use of cycloplegics was first discussed. The writer never uses a cycloplegic in patients over forty years of age. In patients under fourteen years of age, in strabismus cases, and in all patients where the vision can not be improved to normal, a mydriatic or a cycloplegic is used. It is therefore the exception and not the rule that he employs cycloplegics. In opposing the routine use of a cycloplegic in daily office practice, Dr. Davis referred to the difference frequently found in the manifest and cycloplegic refraction, whereas the manifest correction is that best suited to the patient. Furthermore the prescribing of ¼ D cylinders, with axis ½ degrees as to accuracy, and prisms of ¼ or less is overdone, impractical and of no benefit to the patient. In this connection he "raised a word of warning against over-refinement in prescribing glasses"; one must not depend implicitly upon objective tests, but rather give full credit to subjective tests which really control the final decision in prescribing.

Dr. DAVIS described in some detail his methods of procedure in making both objective and subjective tests of the refraction, and concluded with the following:

1. Application of lenses before the test cards should be limited to 15 min.

2. Always correct first the astigmatic error, if present, then apply spherical lenses.

3. After testing each eye, test both eyes by attempting to increase the spherical if hypermetropia, or to decrease it if myopia.

4. Always begin the test with plus lenses.

5. Test cards should be placed slightly higher than patient's head, because this relaxes convergence and incidentally the accommodation.

Dr. J. W. WHITE presented a paper on **refraction** and the **phorias**. He appealed for a routine determination of muscle balance as a measure important and interesting in the consideration of the correction of errors of refraction. After defining and classifying the phorias, he layed stress upon the screen test as being the most reliable and rapid method to employ, applicable in all cases of phoria and in the youngest child. The routine test should consist of:

1. Deviations for distance, measured by the screen test.

2. Deviations for near, measured by the screen test.

3. Convergence near point, by the technique of Duane.

4. Excursions of the eyes in the six cardinal fields.

5. Test of the accommodation with an approximate correction of the ametropia.

In making a diagnosis, Dr. White specified the limits of exophoria or esophoria for distance and near, as indicating divergence excess or insufficiency and convergence excess or insufficiency. If the exophoria or esophoria should increase in looking to the right or left, it is then not a divergence or convergence anomaly but an insufficiency or excessive action of an individual muscle. A vertical deviation may be an anomaly of sursumvergence but nearly all will be found to increase in some particular field, proving an elevator or depressor to be paretic.

As to treatment, he recommended the following: (1) In divergence insufficiency, prism diverging exercises or wearing prism base out in distance glasses,—or better still, advancement of one or both external recti. (2) In divergence excess, prisms base in are indicated, but most relief results from

tenotomy or recession of one or both externi. (3) Convergence insufficiency is improved by correction of ametropia and by converging exercises. Advancement of one or both internal recti may be indicated. (4) Convergence excess if in a hypermetrope should receive full correction; if in a myope, may need an undercorrection. (5) Hyperphorias may be relieved by prism correction, although operation in a vertical deviation is often indicated.

DISCUSSION: Dr. ALEXANDER DUANE stated that he makes a subjective test, securing all the tests possible to produce relaxation, and also makes the accommodation test. He darkens the room somewhat till the patient can just see the test type in order to produce relaxation in some degree. He employs homatropine and finds it reliable in the vast majority of cases. If a + 3.00 D lens is added to the atropinized eye, vision should be clear at 33⅓*cm* or at the 3 D line on the Prince rule. The near point should be just within this point, and if not, more homatropine should be used. One advantage of cycloplegia is that it is valuable not only in the objective but in the subjective tests. Dr. Duane recommends the use of sphero-cylinders in testing for the axis and cylindrical correction in astigmatism. Cycloplegia serves very well in people of middle age, and in fact more commonly than in children.

Dr. G. H. BELL agreed with Dr. Davis about prescribing small cylinders at random and correcting very small errors of astigmatism with the rule. He disagreed with Dr. Davis about homatropine being a pseudo-cycloplegic, and insisted that homatropine paralyzes the accommodation just as well as atropine, if it is properly employed. He has abandoned the use of atropine in refraction, only prescribing it in high myopia cases where absolute rest is important.

Dr. T. B. HOLLOWAY in closing the discussion stated that he uses cycloplegics regularly; homatropine usually, atropine in children. He rarely does a manifest refraction but rather prefers a post-cycloplegic refraction.

MEETING OF APRIL 16, 1923. DR. ELLICE M. ALGER, CHAIRMAN.

Dr. J. W. SMITH reported a case of **an eye injury complicated by scarlet fever.** The unusual coincidence of trauma occurring

in an eye of a patient during the incubation period of scarlet fever and the infrequency of eye complications in this disease are worthy of record.

A boy, aged 9 years, was seen 36 hours after being struck over left eye by a sharp stick. There was marked œdema of the left eyelids without ecchymosis; no sub-conjunctival hemorrhage but slight œdema of ocular conjunctiva; cornea normal, vision normal. Two days later there was marked swelling of the orbital parts and exophthalmos, pain over the right mastoid area and swelling of the submaxillary and cervical glands; temperature 103.2°. Diagnosis of scarlet fever was made, and two days later his sister aged 11, also developed scarlet fever. With the progress of the disease, the lids of the left eye became dull red, exophthalmos increased, superficial gangrene of the conjunctiva with adhesions made its appearance, also limitation of ocular movements downward, later upward and to the right. Mastoiditis, left side, developed rapidly, was operated upon without event.

The outstanding local features of the case were, the absence of ecchymosis after trauma to the eye-lids, membrane formation on the palpebral conjunctiva, blanching and partial gangrene of the ocular conjunctiva, exophthalmos, partial and later complete limitation of ocular movements, with recovery of normal vision and other functions. The general features were, a mild nephritis, convulsions of the Jacksonian type, and acute otitis media, mastoiditis and mastoidectomy. The patient was discharged, cured, seven weeks after the onset of his injury.

Dr. D. B. KIRBY presented a case of **bilateral sixth, seventh, and twelfth cranial nerve paralyses** (published in full in previous issue of Archives).

DISCUSSION: Dr. A. DUANE stated that the lateral movements were associated and also there was convergence. The fact that the patient fails to follow a moving object, but follows when turning the head to one side, may indicate a lesion above the nuclei, but this seems most unusual and it probably is a case of agenesis of the nuclei of these nerves.

Dr. S. A. AGATSTON presented a technique for **muscle recession** in place of tenotomy in the correction of squint, and reported the results of 26 cases thus operated upon.

Briefly the technique is as follows: After exposing the muscle in the usual manner, and holding it forward on a strabismus hook, a double-armed suture is passed through the muscle with the loop on the scleral side 3*mm* beyond the line of insertion. Complete tenotomy is now made, when each needle is inserted into the episclera at a point on a line to which it is intended to recede the muscle, passing the needle horizontally toward the original insertion for a distance of 2*mm*, then emerging pass the needle through the original attachment, picking up the conjunctival margin which has retracted to the inner canthus. The course of the upper and lower needles should be about 4*mm* apart. The suture is now drawn forward and tied, the conjunctival wound being thus closed over the muscle stump.

The author emphasizes the following points in favor of the operation,—its simplicity, brevity, comparative painlessness, exactness of correction, the fact that in moderate deviations it makes tenotomy a useless operation, and advancement or resection unnecessary.

DISCUSSION: Dr. P. C. JAMESON stated his interest in this subject was due to the fact that he had presented a paper before the American Ophthalmological Society in May, 1922, with the same idea and similar technique as that brought forth by Dr. Agatston. He does not regard the recession operation as one which does away with the advancement, and has not proposed this. Recession can be done with as much accuracy as advancement. The muscle should be anchored to the sclera for this renders the effect more exact. Dr. Jameson is no longer timid about suturing the sclera, since his experience in this operation has shown him the ease with which it can be accomplished. Recession takes tenotomy out of the region of uncertainty and places it upon a more certain basis. Five millimeters is as far as one can recede the internal rectus; 8*mm* as far as the external rectus can be receded. A recession of 5*mm* will correct twenty-five degrees of squint.

His observations of results after recession were numerated as follows:

1. Uniformity of results. 95% of corrections have given uniform results.

2. No divergence follows the operation, but an insufficiency of rotation at times may occur probably due to placing the internal rectus further back than 5*mm*.

3. There is protection of convergence and active motility is retained.

In summary he stated that the recession,—1st. Primarily attacks the offending muscle, thereby correcting the defect at the seat of the deformity. 2nd. It leaves an unmutilated muscle system capable of normal action and vigorous work. 3rd. It enlarges the effect of tenotomy by carrying the muscle end back to the equator if necessary, and renders tenotomy by reason of scleral fixation a safe and reliable procedure. 4th. It safe-guards convergence to a striking degree. 5th. Its corrective capabilities are extensive and comparatively uniform.

DISCUSSION: Dr. ELBERT S. SHERMAN asked what suture material is used and how long before the sutures are removed. Dr. Agatston replied that the braided silk sutures are removed on the sixth day.

Dr. A. E. DAVIS inquired as to the effect, if recession is made back of the equator of the globe. Dr. Agatston had not seen any failure of muscle action following operation.

Dr. H. V. HUBBARD presented a preliminary report of an **advancement operation** by **over-lapping,** with report of six cases.

Technique: The muscle is exposed by a single meridional incision through conjunctiva and Tenon's capsule. It is then picked up and stitched on two strabismus hooks, and grasped by two pairs of advancement forceps *2mm* apart, at a distance from the muscle insertion of about 1½ times the number of millimeters of shortening desired. The muscle is then divided between the forceps and the cut end overlapped by drawing the cut end and the muscle over the tendon, well up to its insertion. Two sutures of No. 3 black silk are passed through conjunctiva, mattressed through muscle and tendon together and out through conjunctiva on the opposite side, one near the tendon insertion, the other near the cut end of the tendon. These are removed on the tenth day. Tenotomy of the opposing muscle may be also necessary.

Advantages of this method are:

1. No sinking of caruncle because of horizontal incision.
2. No danger of injury to sclera by needles.
3. Less liability of sutures to tear out from delicate muscles.
4. No disturbance of tendon insertion and consequent vertical deviation.
5. Amount of correction easily governed by amount of overlapping.
6. Simplicity.

Six cases are reported, in four of which the overlapping operation was performed on one muscle with tenotomy of the opposing muscle. Results showed paralellism in four cases, and binocular single vision in three. In two cases of 20 degrees of convergence, the operation was performed on both external recti, without tenotomy, five to eight degrees of convergence resulting.

DISCUSSION: Dr. A. E. DAVIS had witnessed two or three of these operations, and regarded it as a very neat and simple procedure and one which definitely strengthens the muscle.

Dr. J. W. WHITE asked if the speaker meant binocular single vision or the eyes straight and in parallelism?

Dr. HUBBARD replied, yes, binocular single vision as tested by stereoscopic pictures.

Dr. A. J. HERZIG asked how much overlapping is required for a given amount of squint. He replied, 1*mm* of overlapping to correct five degrees of squint, was attempted in calculating the degree of effect.

Dr. A. J. HERZIG: What is the extent of the tenotomy, if necessary. Dr. HUBBARD: It varies with the case.

Dr. RAY R. LOSEY: Are these not very perfect results in the number of cases reported? Reply: They certainly are.

Dr. H. H. TYSON: Is this not the same operation as the one Dr. H. Knapp performed some years ago, in which he folded or knuckled the muscle instead of cutting it off? Dr. HUBBARD: The same except that the muscle here is divided and overlapped.

The paper of the evening, entitled, "Recurrent ocular paralysis," was read by Dr. A. DUANE, and is published in full in the July Archives.

REPORT OF THE TRANSACTIONS OF THE OPHTHALMOLOGICAL SECTION OF THE ROYAL SOCIETY OF MEDICINE.

By Mr. H. DICKINSON, London.

A meeting of the Section was held on Friday, June 8th, under the presidency of Mr. A. L. Whitehead.

Cases

Mr. H. M. Joseph showed a case of **progressive macular changes associated with tremors.** The patient was a woman aged 34. 2½ years ago she had tremor of the right hand, but no visual defect. When he saw her for the first time 2 years ago there were light spots about both maculæ, and the corrected vision was $\frac{6}{12}$. Since that date the spots had greatly increased in number. Vision had now fallen to $\frac{6}{18}$, and the tremor was more marked and extensive. Wassermann was negative.

Dr. Rayner D. Batten regarded the case as an adult instance of cerebro-macular disease. Probably the same toxin might be at work, producing different symptoms at different age periods. Infantile, juvenile and senile types were now recognized, and the present case seemed to supply the missing link, the adult type. He entered into the reasons why he held that view, and showed slides of various cases he knew of.

Mr. F. A. Juler referred to a case under Mr. Leslie Paton, a boy aged 18, which Mr. Paton diagnosed as cerebro-macular degeneration, and said he, Mr. Paton, regarded it as a connecting link between amaurotic family idiocy and later cases of cerebro-macular degeneration.

Dr. GORDON HOLMES said he was familiar with this tremor since the epidemics of lethargic encephalitis. He did not suggest that this patient's condition was a sequel to lethargic encephalitis, but he thought the area of brain affected agreed in the two conditions. The most important pathological lesion in these cases was disease in the substantia nigra and in the neighborhood of the mesencephalic nuclei; it seemed to be a primary degeneration of certain portions of the gray matter of the brain.

The PRESIDENT said that in the cases of encephalitis lethargica he saw he had not noted any fundus changes, a curious fact if the basal ganglia were affected.

Familial Nodular and Reticular Keratitis.

Mr. MONTAGUE HINE read a paper on this subject, based on three cases shown. This family, he said, helped to demonstrate a close connection between the two conditions which did not appear so obvious when seeing individual cases. Mr. Basil Graves, who examined these three cases with the corneal microscope, aptly described the appearance as a "fine sheeny speckling," and suggested that the tissue might be impregnated with a fine translucent granular deposit, which might have a refractive index different from that of the cornea. Both eyes showed the same change. The girl, aged 10, gave a history of slight headache, but no special intolerance of light. Right vision was $\frac{6}{12}$, left $\frac{6}{9}$. In her the opacity consisted of a number of fine lines, many of which were seen to be composed of tiny dots; but the lines here did not form a meshwork, but remained separated and uncrossed. One line suggested an obliterated vessel, resulting from previous inflammation. In the left cornea there was a combination of two of the linear opacities with several of the small rings, similar to those in her brother.

The mother, aged 36, said that her eyes had worried her since infancy; she had not had them examined before February last, when she came to be tested for glasses; R. vision was $\frac{6}{18}$, left $\frac{6}{12}$. The central area of the cornea was seen to be studded with numerous, rather closely-set grayish-white opacities; some in the form of rings, others nodular, while

in places the nodules became confluent. The periphery of the cornea was clear in each eye.

The boy, aged 14, gave a history of severe headaches and intolerance of light since infancy. His cornea showed very similar changes to those seen in his mother. There was one child whose eyes were normal. In all the cases the Wassermann was negative, but the maternal grandfather was said to have had syphilis.

Mr. H. NEAME spoke of a case under Mr. Fisher's care who had lines of opacity in one eye, and nodules in the other; the lines appeared to be about the middle of the substantia propria.

Tuberculous Conjunctivitis.

Mr. R. L. REA showed a young woman, aged 23, with tuberculous conjunctivitis, in the form of ulcerative patches on the lids of both eyes. He had arranged for her to be sent to Leysin, in Switzerland, to have the direct sunlight treatment, from which he had seen there very good results. He hoped to show her again after she had received that treatment.

The Embryology of Congenital Crescents.

Miss IDA C. MANN read a paper on **Some Suggestions on the Embryology of Congenital Crescents,** which was supplemented by some excellent micro-photographs and drawings shown by the epidiascope. The main thesis is as follows:

The group of cases under consideration are characterized by the fact that they are congenital, stationary, not necessarily associated with any one error of refraction, and situated, in 70% of the cases, below the disk. There is, apparently, some factor which determines the greater proportion of inferior crescents, which must be sought in the normal development of the disk, since an abnormality is more likely to be associated with a normally existing embryonic structure than it is to arise *de novo* as a pure aberrance. The embryonic structure in this case is the choroidal fissure. The presence of congenital crescents in other situations does not detract from the fact that the choroidal fissure is the determining

factor in the inferior type. The presence of the fissure will merely account for the preponderance of this type, since the essential condition for the formation of a crescent is that the pigmented outer layer of the optic cup should not reach quite up to the insertion of the optic stalk. The presence of the fissure merely allows of this occurring more easily below the disk than elsewhere. From the illustrations shown it can be seen that the essential difference from the normal consists of the failure of the pigment epithelium and nuclear layers of the retina to reach the edge of the optic disk in its lower part; hence there is a small area below the disk in which all the elements of the retina except the nerve fiber layer are absent, so that this layer is separated from the sclerotic only by a very thin extension of the choroid. Developmentally it has been shown that eversion of the unpigmented layer of the optic cup normally takes place in the upper end of the choroidal fissure. This is seen in a large number of vertebrates. In some animals, including man, the small everted portion of the inner layer loses its connection with the rest of the inner layer and disappears, but in some other types (birds) the connection is retained and nerve fibers grow into the everted projection. If in man the everted portion developed aberrantly and retained its connection with the inner layer, a condition resembling that normally present in birds might result. Such a condition is present in a congenital inferior crescent, which bears a striking resemblance to the structure of the lower part of the disk of the normal bird.

The occurrence of crescents other than inferior, i.e., the failure of the pigment epithelium to reach the edge of the disk in other situations, is comprehensible in the light of the work of the late George Coats, who showed that any one part of the optic cup may differentiate into tissues resembling that normally derived from another part.

The failure of the choroid and occasional thinning of the sclera in the crescent has its parallel in normal development. The mesoderm in contact with the outer layer of the optic cup differentiates into choroid, while that in contact with the inner layer—whether inside the cup or everted along the fissure—does not. The scleral condensation, in its turn, follows the developing choroid.

It may therefore be said that congenital crescents in any situation are due to the failure of the pigment epithelium to reach the site of implantation of the optic stalk. This failure may occur anywhere, since aberrant differentiation of the various parts of the secondary optic vesicle is known to occur. It is, however, much more likely to occur below the disk than elsewhere, since it is normal here at one stage of development in man. Hence the greater frequency of inferior crescents, which can be looked on as developmentally homologous with the cauda of birds, the architectural basis of the cauda being present, though small, in the normal human embryo. The failure of the choroid is directly correlated with the absence of the pigmented epithelium, and the occasional failure of the sclera has its parallel in the retardation of condensation along the fissure during development.

The PRESIDENT complimented Miss Mann on her exposition and the beauty of her slides.

Sir WILLIAM LISTER argued that the inferior crescent was a retraction crescent, similar to the ordinary retraction crescent of myopia occurring at the macula.

Sir JOHN PARSONS agreed with Miss Mann's view, but in many cases the condition was associated with failure in closure of the choroidal fissure. With regard to the myopic so-called retraction crescent—a term he did not like—he thought this was probably an atypical coloboma, and that it had no relation to a stretching of the walls of the globe associated with myopia.

Miss MANN replied that the presence of staphyloma of the disk could also be explained as part of the retardation of the sclerotic condensation along the lines of the fissure. She agreed that myopic crescents also had a congenital explanation, though in them some pathological process was superimposed.

Mr. P. DOYNE read a brief paper on the Tourney reaction, and it was discussed by Mr. J. H. FISHER and Mr. RAYNER BATTEN.

REPORT ON THE PROGRESS OF OPHTHALMOLOGY.

Abstracts by Drs. A. N. Alling, New Haven; M. J. Schoenberg, New York; T. H. Butler, London; P. G. Doyne, London; and K. Wessely (*Archiv für Augenheikunde*), Würzburg.

Edited by Matthias Lanckton Foster, M. D., F. A. C. S., New Rochelle, N. Y.

(*Continued from September issue.*)

II.—REMEDIES AND INSTRUMENTS.

24. Albrich. **Results of iontophoresis.** *Zeitschr. f. Augenheilkunde*, xlv., No. 6, p. 391.

25. Birkhäuser. **Clinical results and experimental studies concerning iontophoresis, particularly the avoidance of lesions of the epithelium, and the treatment of corneal opacities.** *Klin. Monatsbl. f. Augenheilkunde*, August–September, 1921, p. 333.

26. Blatt. **Digestive treatment of corneal scars.** *Ibid.*, p. 322.

27. Fuchs. **Fifty enucleations with Seidel's infiltration anæsthesia.** *Archiv f. Ophthalmologie*, civ., No. 4, p. 351.

28. Gifford, S. R. **Some facts about salicylate therapy.** *American Journal of Ophthalmology*, December, 1922.

29. Haab. **How one can study in his own eye, the cornea, lens, and anterior part of the vitreous.** *Münch. med. Wochenschr.*, 1921, p. 728.

30. Jendralsky. **Parenteral milk therapy.** *Zeitschr. f. Augenheilkunde*, xlvi., pp. 27 and 95.

31. Liebermann. **Treatment of eye diseases, especially gonorrheal ophthalmia, with injections of milk.** *Ibid.*, xlvi., p. 199.

32. Mans. **Treatment of scrofulous eye diseases with injections of milk.** *Kindertuberculose*, i., p. 45.

33. Sandmann. **Protein body therapy in ophthalmology.** *Münch. med. Wochenschrift*, 1921, p. 1571.

34. Schwarzkopf. **Iontophoresis treatment of corneal ulcers.** *Klin. Monatsbl. f. Augenheilkunde*, June, 1921, p. 879.

35. Vogt. **Erroneous diagnoses with the slit lamp microscope with special reference to phantoms.** *Archiv f. Ophthalmology*, cv., p. 507.

36. WIESE. **Milk injections in eye diseases.** *Zeitschrift f. Augenheilkunde*, xlv., No. 6, p. 339.

ALBRICH (24, **Results of iontophoresis**) obtained 99 per cent. of cures in 588 cases of infectious corneal diseases, 97 of the cures within the first week. The trophoneurotic cases, 154, were cured within a few days. The results were less satisfactory in parenchymatous keratitis. Scrofulous troubles are favorably influenced. In trachoma iontophoresis is a very helpful aid.

BIRKHÄUSER (25, **Iontophoresis**) thinks that the injuries of the corneal epithelium observed after iontophoresis, no matter how carefully it may be applied, are not due to the cocaine, nor to the iontophoresis itself, but are purely mechanical. These he tried to avoid by means of an apparatus so constructed that only the electrolytic fluid came in contact with the cornea, yet epithelial defects could be regularly detected by fluorescin. Then he found that if he wrapped the metallic electrode with cotton, when it was the cathode, these defects were avoided. He believes in the clearing up of corneal opacities by iontophoresis and reports concerning ten cases of old corneal scars, in nine of which he obtained a distinct, in some a considerable improvement of vision. The treatment requires patience, as about thirty sittings must be expected, each two minutes long, giving iodine chloride iontophoresis with a current of two milliamperes. Much more iodine is carried in this way through the cornea than by simple diffusion. In the discussion of this paper Siegrist remarked that as yet he had been unable to convince himself that old corneal opacities cleared up under the influence of iontophoresis.

SCHWARZKOPF (34, **Iontophoresis treatment of corneal ulcers**) tested the iontophoresis treatment on twenty-seven bad, progressive cases of ulcus serpens, and is less enthusiastic about the value of this treatment than some writers. Yet he obtained fourteen cures and three cases of temporary improvement. Many patients suffer severely. One good thing about the treatment is that if it fails it does not prevent the successful use of other forms of treatment. Thus he has seen irradiation with ultra-violet light succeed occasionally when iontophoresis had failed.

BLATT (26, **Digestive treatment of corneal scars**) after some experiments in vitro which showed a distinct digestive action by a three per cent solution of pepsin and hydrochloric acid, tried the solution on rabbits and found that instillation into the conjunctival sac and injection into the substance of the cornea produced no bad results. Instillation into the conjunctival sac of men with leucomata proved inefficient. Of four injections into the cicatricial corneæ of men, two failed, and in two a clear spot was caused, which could be made use of after an iridectomy. No harm resulted in any case.

GIFFORD (28, **Some facts about salicylate therapy**) has found no satisfactory explanation for the beneficial effects of salicylates in ocular disease. Large doses must be given because the drug is quickly eliminated in the urine. 60–90 grains a day may be given even for months. If the stomach rebels the drug may be administered per rectum. Cincophen and neocincophen have been substituted in some cases especially where salicylates produce gastric irritation. He has found a salicyl but no free salicylic acid in the aqueous. No greater amount of salicyl could be obtained from the inflamed eye of a rabbit than from the normal eye.

FUCHS (27, **Fifty enucleations with Seidel's infiltration anæsthesia**) reports the results as very good. Anæsthesia is secured by five instillations of a 10% solution of cocaine into the conjunctival sac. Then an injection of *½ccm* of a 1% solution of novocaine with adrenalin is made subconjunctivally about the limbus. Five minutes later four injections are made with a needle *5cm* long of *2ccm* of a 1% solution of novocaine into the orbit, the point of the needle being gradually advanced to midway between the formen opticum and the entrance of the optic nerve. The operation is begun twenty minutes later, and performed under complete anæsthesia. After pain appeared in sixteen per cent. of the cases, headache in twenty-four per cent.

HAAB (29, **How one can study his own eye, the cornea, lens, and anterior part of the vitreous**) for this purpose places a lens of twenty-five or thirty diopters, with a concave mirror of about *16cm* focus behind it, in front of a corneal microscope provided with cross slits. If one looks into this apparatus, and has his own eye illuminated with Gulstrand's slit lamp,

he can obtain, after a careful adjustment, a good picture of the cornea, can see the nerve fibers and, when the light is very oblique, the honeycomb appearance of the endothelium. Naturally the picture is monocular. The pupil needs to be dilated for examination of the lens, and also for the rather more difficult investigation of the anterior part of the vitreous, for which a lens of ten or twenty diopters should be used.

JENDRALSKY (30, **Parenteral milk therapy**) reports concerning 129 cases. He concludes that good results are particularly to be expected in fresh, moderately severe cases of gonorrheal conjunctivitis, in rheumatic and traumatic iritis, and in many cases of interstitial keratitis. In the last there is relief of the subjective symptoms and of the blepharospasm. Trachoma, interstitial keratitis, and choroiditis are not essentially affected by this treatment.

LIEBERMANN (31, **Treatment of eye diseases, especially gonorrheal ophthalmia, with injections of milk**) finds that in the majority of cases of gonorrheal conjunctivitis the benefit is to be noted on the day following the second injection of milk. The secretion and the chemosis subside, and thus the cornea is protected. In lymphatic keratitis the irritation is reduced by the milk injections, while in interstitial keratitis the efficiency of the specific treatment applied at the same time is increased.

MANS (32, **Treatment of scrofulous eye diseases with injections of milk**) uses cow milk which has been boiled for three minutes in doses of 1*ccm* in infants, 6*ccm* in children of thirteen, and 10*ccm* in adults, injected intragluteally. These doses are repeated from two to six times. The photophobia and blepharospasm almost always disappear five or six hours after the injection, and this improvement often persists, going on in many previously obstinate cases to a quick recovery. He asserts that the milk cannot be replaced by an artificial preparation, and has the impression that the fever produced is of essential importance to the result.

SANDMANN (33, **Protein body therapy in ophthalmology**) finds that very good results are obtained in two thirds of the cases of conjunctivitis of infants and of adults. He never saw any benefit in chronic uveitis. In acute iritis there is only slight objective improvement, but almost always the

subjective troubles are relieved, though often for only a short time. He advises care in cases of scrofulo-tuberculous children, as in them the general reaction is often great.

WIESE (36, **Milk injections in eye diseases**) does not consider the febrile reaction essential to success. His clinical results were good in acute iritis, but not in syphilitic iridocyclitis. In scrofulous eyes he often observed improvement as regards the secretion, the photophobia, and the subjective symptoms, but usually with no permanent benefit. In corneal ulcers and eye infections the result was very variable. Trachoma is essentially obstinate. Finally he comes to the conclusion that injections of milk should be confined to very serious cases of disease, as it is a heroic remedy, and that it should not be relied upon alone, but used in conjunction with other treatment. Even though he saw no specially good results he thinks the attempt to combine this with the specific treatment of bad cases of tuberculosis and syphilis of the eye justified.

VOGT (35, **Erroneous diagnoses with the slit lamp microscope**) distinguishes between the errors that are made through a faulty condition or use of the apparatus, and those caused optically within the media. The latter he considers at some length. Among the large number of phantoms which appear in the focal light are the sharply defined shadows in the cornea which are formed behind every vessel, every foreign body or infiltrate. Likewise shadows appear in the lens behind remains of pigment, of circumscribed opacities. Occasionally bits of mucus on the cornea may simulate deposits or blebs on the posterior surface of the cornea. He then describes quite a number of hitherto unreported reflexes from the optical surfaces, diffuse reflections from them and from the parenchymata. Errors caused by refraction are explained partly by the layer of fluid, which often accumulates between the margin of the lid and the cornea and distorts the relief of the iris, and make the cornea toward the lower limbus appear thicker than it really is. Even in localization of depth, as of lenticular opacities, the refraction may cause mistakes. Finally Vogt warns against an overestimation of the value of the slit lamp microscope, through which considerable errors may be made, and especially warns beginners against the use of great enlargements.

III.—ANATOMY, PHYSIOLOGY, PATHOLOGY.

37. APEL. **Monolateral congenital anophthalmos.** *Berl. klin. Wochenschr.*, lviii., p. 917.

38. ASK, FRITZ, and VAN DER HOEVE, J. **Development of the canaliculi under normal and abnormal conditions.** *Arch. f. Ophthalm.* cv., p. 1157.

39. BLATT. **Diagnostic utilization of the condition of the cerebrospinal fluid in syphilitic eye diseases.** *Ibid.*, cvi., p. 357.

40. CLAUSEN. **Congenital aniridia and heredity.** *Klin. Monatsbl. f. Augenheilkunde*, xlvii., p. 116.

41. CLAUSEN. **Typical hereditary coloboma of the macula.** *Ibid.*

42. FREY. **Congenital membrane formation in the eye.** *Ibid.*, lxvi., p. 760.

43. FRIEDE. **Congenital cornea plana and its relation to microcornea.** *Ibid.*, lxvii., p. 192.

44. GILBERT. **Herpetic disease of the eye.** *Arch. f. Augenh.*, lxxxix., p. 35.

45. HOLM. **An anatomically examined case of aniridia.** *Klin. Monatsbl. f. Augenheilkunde*, lxvi., p. 730.

46. IGERSHEIMER. **Pathogenesis of phlyctenular disease of the eyes.** *Arch. f. Ohrenheilkunde*, cv., p. 640.

47. IGERSHEIMER. **Syphilis of the visual apparatus.** *Klin. Monatsbl. f. Augenheilkunde*, August-September, 1921, pp. 317 and 338.

48. KRAUPA, E. and M. **Physiognomy of congenital syphilis.** *Zentralbl. f. inn. Med.*, xli., No. 50.

49. MAGITOT, A. P. **How to know the blood pressure in the vessels of the retina.** *American Journal of Ophthalmology*, October, 1922.

50. MOORE, R. FOSTER, LANG, BASIL T., NEAME, H., and DOYNE, P.G. **Some causes of amaurosis in infants.** *British Journal of Ophthalmology*, August, 1922.

51. SCARLETT, H. W. **Opaque canal of Cloquet with persistent hyaloid artery.** *American Journal of Ophthalmology*, December, 1922.

52. SCHOTT. **Coloboma of the macula.** *Klin. Monatsbl. f. Augenheilkunde*, lxvii., p. 415.

APEL (37, **Monolateral congenital anophthalmos**) describes an infant born with one eye perfectly normal and the other one absent. No other malformations could be found. The lids on the side of the anophthalmos were developed, but the palpebral fissure was so narrow that they could not be separated. The entire absence of an eyeball was therefore determined wholly by palpation, which revealed no trace of even a rudimentary eyeball. As there were no other disturbances of development of the skull, especially no signs of a mechanical

hindrance to the development of a rudiment of an eye, the cause was assumed to be an embryonic anomaly.

ASK and VAN DER HOEVE (38, **Development of the canaliculi under normal and abnormal conditions**) observed a case of oblique cleft of the face with coloboma of the lower lid in which the lower punctum lay on the lateral side of the coloboma while the caruncula was in its normal position. The question was how the lower punctum came to be on the temporal side of the coloboma. Ask went back to and completed his former embryological studies of the development of the canaliculi, and concluded that the epithelium of the margin of the lid takes no active part in the formation of the punctum. He confirmed the statement that the caruncle comes wholly from the lower lid, from embryonal rudiments of the cilia and Meibomian glands which become as it were cut off from the rest of the epithelial rudiments of the margin of the lower lid by the rudiment of the canaliculus inserted fairly far laterally. Thus the development of the caruncle and of the lower canaliculus are closely connected. The presence of the punctum and a portion of the canaliculus on the temporal side of the coloboma could be explained only through a secondary division of it from the epithelial rudiment of the canaliculus growing out from the lacrimal passage. In this case the cause of the cleft appeared to be an amniotic cord. The proximal end of the canaliculus opened in the palpebral fissure, the distal end was blind within the callosities formed by the amniotic cord.

CLAUSEN (40, **Congenital aniridia and heredity**) describes a family of eight living brothers and sisters, seven of whom had congenital aniridia. The father also had aniridia. Almost all had the syndrome of cataract, glaucoma, and nystagmus. In another family with equally marked heredity of aniridia and cataract he found some relatives in whom the iris defect was confined to the mesoderm, while the pigment epithelium seemed macroscopically to be intact. In one case there was simply a coloboma of the iris at the typical place. In several cases the vision was greatly improved after extraction of the usually badly fastened lens; in one it became $\frac{5}{10}$ after correction. Clausen thinks the cause of aniridia is primarily a lack of mesoderm, and not an arrest of development of the ectoderm. But the abnormal behavior of the lens and zonula

are not taken into account in this assumption. Slight anomalies in the fovea were not excluded. Unfortunately no notes were taken of the behavior of the sphincter pupillæ in the cases with apparently intact pigment epithelial layer of the iris.

In this case HOLM (45, **An anatomically examined case of aniridia**) found the fovea centralis absent, but demonstrated a distinctly marked area, characterized by a thickening of the ganglion cell layer, in which the cones were thicker than normal, the outer granular layer correspondingly thinner, and the oblique course of Henle's layer of fibers absent. In other respects, aside from the rudimentary iris and an abnormally small lens, the eye appeared to be normal.

CLAUSEN (41, **Typical hereditary coloboma of the macula**) reports a condition of this nature found in a father and a son. The papilla of the father was completely surrounded by medullated nerve fibers. This coupling of anomalies seems to Clausen to exclude inflammation as a cause of coloboma of the macula, while it favors the assumption that the malformation is a hereditary anomaly.

SCHOTT (52, **Coloboma of the macula**) observed coloboma of the macula in two sisters, whose parents had normal eyes. In each of the four eyes there was at the posterior pole a peculiar oval, and these were placed symmetrically in each pair of eyes. These ovals presented the usual appearance of coloboma of the macula, sharply defined borders, proliferation of pigment, places without pigment, and a slight excavation of the base. Central vision varied from $\frac{3}{36}$ to $\frac{6}{12}$. An inflammatory origin seems to be excluded in these cases, the same as in Clausen's. Elschnig's explanation of the origin of atypical colobomata, that they are due to a growth of parts of the optic vesicle in an abnormal direction, seems to Schott the most nearly satisfactory, but he suggests that the possibility of an early destruction of already formed elements should be taken into account.

In the case described by FREY (42, **Congenital membrane formation in the eye**) there was an extremely delicate red brown membrane attached to the ciliary body by four offshoots. During movements of the eyeball the membrane would fall into the anterior chamber, and then suddenly back into the vitreous. Movements were made also while the eye was quiet.

FRIEDE (43, **Congenital cornea plana and its relation to microcornea**) presents the following changes as characteristic of congenital cornea plana. (1) Abnormal flatness of the cornea and of the neighboring sclera. (2) Indistinct limbus because of encroachment of the sclera upon the cornea. (3) Corneal refraction of 28 to 29 D on the average. (4) Corneal radius of about 10*mm*. (5) Total refraction from 7 to 9 D hypermetropia. These characteristics suffice for differentiation from true microcornea, which is always associated with microphthalmos. Cornea plana is to be regarded as a circumscribed inhibition of development of the mesoderm of the anterior segment of the eyeball, microcornea and microphthalmos of the entire eyeball.

SCARLETT (51, **Opaque canal of Cloquet with persistent hyaloid artery**) describes a rather usual case of this anomaly. A light bluish-gray stalk attached to the nerve-head came forward into the vitreous well up to the temporal side of the lens. It contained the artery which was filled with blood. There were vessels on the surface which came from the central artery or the disk. A large irregular patch of connective tissue was seen in the retina and several areas of disturbance of choroidal pigment. The vision was reduced to light perception.

This research, which was begun in 1913, has been carried on by succeeding Lang scholars at Moorfields Eye Hospital. MOORE, LANG, NEAME and DOYNE (50, **Some causes of amaurosis in infants**). Infants with very deficient or absent sight are comparatively common features of a large ophthalmic clinic. The question of prognosis in these cases is of the greatest importance. In this paper some 60 cases have been noted and followed up for some considerable time. The cases were carefully selected so that no doubt as to their eligibility could be entertained. Then a very thorough examination along a routine plan was carried out. After which the cases were watched, attending the hospital at definite intervals. Of the 60 cases, 19 proved to be mentally defective. This is the largest grouping. These children in nearly all cases developed a certain amount of sight. It would appear that the condition was attributable to a defect of the higher cerebral centers. No local signs or changes were observed in the eyes themselves. The next largest grouping is that of Albinism, 17 cases. These

children all eventually developed fair vision. The pigment deficiency of the retina and choroid appears to delay or stultify the development of macula fixation. These two groupings comprise a large proportion of the cases investigated. Five cases of temporary amaurosis were observed. The condition was in all probability associated with a mild attack of meningitis. These cases recovered their vision, in some instances with great rapidity. Of the other cases 7 were due to cataract, 7 to fundus disease and 5 to gross refractive errors. Many other interesting points were investigated;—the question of consanguinity of the parents, the position of the infant in the family, congenital syphilis and premature birth. Of these factors it may be said that no very definite correlation with the amaurosis was established. Associated features such as head nodding, eye rubbing and nystagmus were noted. Here again no definite correlations were made out. Eye rubbing however seemed usually to be associated with some local defect of the eyeball.

MAGITOT (49, **How to know the blood pressure in the vessels of the retina**) gives further details of the work done by Bailliart and himself. He makes the following statements: The intraocular arterial pressure is normally higher than the ocular tension. The venous pressure is not always as great as the ocular pressure. In order that pulsation may appear in the arteries and veins of the disk it is necessary that the pressure exerted by the ocular tension on the walls of the vessels should balance the pressure of the blood column. In cases of normal general pressure the ratio between the local arterial pressure and the general pressure is as 0.45 is to 1. The Bailliart pressure gauge, which is used during these experiments, consists of a cylinder containing a spring. The pressure is recorded through a rod which projects from the cylinder and is held in contact with the eyeball. He thinks many valuable deductions can be drawn from these observations.

BLATT (39, **Diagnostic utilization of the condition of the cerebrospinal fluid in syphilitic eye diseases**) comes to the following conclusions: (1) A positive Wassermann of the cerebrospinal fluid can not only settle the diagnosis of a syphilitic neurologic eye disease, but in many cases aids much in locating the central or nerve lesion which is the cause of the

ocular change. (2) A positive result from the cerebrospinal fluid can always be utilized, a negative only when the blood Wassermann is positive. (3) A positive result indicates unquestionably syphilitic disease of the central nervous system, but a negative result does not contraindicate it. (4) A positive Wassermann of the cerebrospinal fluid does not indicate that a disease of the central nervous system is to be expected at some time in the future, but it shows that a syphilitic disease of the central nervous system is actually present at the time, even though it may not yet have manifested any clinical symptoms.

IGERSHEIMER (47, **Syphilis of the visual apparatus**) has been studying the question of spirochætæ in interstitial keratitis in five or six hundred syphilitic animals. Fifty-four of these had metastatic interstitial keratitis, although other symptoms of syphilis were not found in the eyes, with the exception of an occasional iritis. In the fresh cases with commencing cloudiness of the cornea he found spirochætæ almost wholly in the posterior third of the clear segment of the cornea free from inflammation. In the older stages there was a deep seated opacity of the cornea which appeared anatomically as a new formation on the posterior surface, consisting of endothelogenous connective tissue with lymphocytes, and occasionally leucocytes. As long as these eyes were inflamed spirochætæ were always demonstrable in large numbers, but not in the cornea itself, in this posterior formation. As the spirochætæ almost always lay in the posterior layers of the cornea throughout the various stages, Igersheimer experimented by injecting into the anterior chamber a new preparation of salvarsan, with good results.

Igersheimer has also investigated fourteen cases of progressive paralysis, seven of which had optic atrophy, from the eyeball to the corpus geniculatum, but was not able to detect any surely spirochætic condition in the optic tract. Cords said in the discussion of this paper that his investigations along the same line had been with negative results. Bergell claimed that the reason why spirochætæ could not be demonstrated in the freshly inflamed areas of the cornea was that the fatty capsules of the spirochætæ, upon which their staining depends, are dissolved by the action of ferments.

KRAUPA (48, **Physiognomy of congenital syphilis**) makes the point that the present generation of physicians is inclined to rest the diagnosis of congenital syphilis upon the outcome of the serological reactions, and to pay too little attention to the clinical picture. But as the Wassermann reaction proves negative in quite a large percentage of unquestionable cases of congenital syphilis, and as one of the signs pertaining to the eye of Hutchinson's triad is very often not present, it would be well to utilize more than is usual other signs of congenital syphilis in making the diagnosis. Among the signs enumerated are the formation of the skull, the form of the upper jaw and of the chin, abnormalities in the shape of the nose, the protean malformations of the teeth, the color of the face, the shape of the cornea and the color of the iris.

GILBERT (44, **Herpetic disease of the eye**) describes the histological condition in a case of herpes zoster trigemini which had lasted two or three weeks. The eyeball and contents of the orbit were removed twenty-four hours after death. He found a neuritis and perineuritis of the ciliary nerves on each side of the ciliary ganglion, which could not be examined, round cell infiltration of the choroid, episclera and conjunctiva in the immediate neighborhood of the inflamed nerve twigs. He concludes that herpetic keratitis and uveitis are inflammations introduced by way of the nerves which may, but does not necessarily, induce necrosis of the uvea. Likewise he considers herpetic corneal disease as a corneal neuritis.

IGERSHEIMER (46, **Pathogenesis of phlyctenular disease of the eyes**) has investigated the later fate as regards tuberculosis of ninety-two patients who had suffered from scrofulosis of the eye. Tuberculosis of the adult eye develops later in such cases comparatively rarely. An active process in the lungs was demonstrable in thirteen per cent., and a like percentage of healed conditions in the lungs was found. Altogether their findings would seem to indicate that the occurrence of a scrofulous disease in childhood may exert a certain protection against active tuberculosis later, or at least against its malignant course.

(*To be continued.*)

BOOK REVIEWS.

XIII.—**The Principles and Practice of Perimetry.** By Dr. LUTHER C. PETER. II. edition, 281 pages, published by Lea & Febiger, Philadelphia and New York, 1923. Price $4.00.

This second edition of Dr. Peter's well-known book has been almost entirely rewritten and brought up to date. It is considerably larger than the first edition, and contains many new illustrations. A clear and concise description of the anatomy and physiology of the visual pathway is given, as well as the physical and physiological principles which underlie field taking, such as central and indirect vision, visual acuity, laws of projection and direction, corresponding retinal points, etc. The most important changes, however, are to be found in Part III, on Methods, Technic, Instruments and Charts, and in Parts IV and V, on General Pathology of the Visual Field and Special Pathology of Fields, respectively. In Section III the author carefully describes in considerable detail not only his own methods of field taking and scotometry and the instruments used by him, but also the methods and instruments in use by other leading specialists in this line of work. Simple instructions are also given for the construction of tangent screens, and to assure accuracy in their construction, a table of natural tangents is given. These instructions should be welcomed by most ophthalmologists, for a tangent screen is now a necessity in every well-equipped office, and can be constructed at a trifling cost. In this chapter Dr. Peter also emphasizes the importance of qualitative perimetry and scotometry, a very important but almost unexplored field. Only on one point are we inclined to differ with the author, and that has to do with the size of test object used in his scotometric work. The doctor uses a comparatively large object and states on page 94 that a thirty-minute object is the most

suitable for measuring any scotoma in the central area. Such an object used at one meter would measure 8.7*mm* in diameter. With an object of this size we have never been able to detect early changes about the blind spot in glaucoma and toxic amblyopia as well as with a 1*mm* object, even when qualitative scotometry was resorted to. In the chapters on General and Special Pathology of Fields the author gives a very comprehensive review of our present knowledge concerning field defects and their relation to disease.

The book is comprehensive and well written, and should find a place in the library of every ophthalmologist. As in the previous edition, a complete bibliography is appended, which greatly enhances the value of the book. A. H. T.

XIV.—**Report of the Government Ophthalmic Hospital, Madras, India, for 1922.** By Major R. E. WRIGHT, I.M.S., Madras, India, 1923.

The annual report of the Madras Eye Hospital for 1922 shows that 4031 in-patients and 20,139 out-patients were treated. 1571 cataract extractions were made, generally by the usual capsulotomy method, though the Barraquer operation was attempted in 250. The cataract was delivered in its capsule in 168 cases; in 76 it failed; vitreous escaped in 23. The author thinks that the Barraquer operation is probably the best intracapsular method in selected cases. It is not justified in—a. bulging eye, b. friable capsule, c. immature cataract with a normal suspensory ligament, d. Morgagnian cataract. In the use of the suction cup the beginner runs the risk of getting entangled in the iris. The writer furthermore believes that the vitreous deprived of its support from the suspensory and capsule is in a menaced position and permits the invasion of the vitreous by all elements that give rise to vitreous opacities which, if of an organized type, tend to be progressive and incurable. The reviewer, who has been practicing a modified intracapsular method for 12 years and has had repeated opportunity of observing the late results of his cases, has not been able to confirm these vitreous changes. 187 sclerocorneal trephinings were performed. 2350 were refraction cases, and there were 213 fundus disease cases. In the large out-patient service there occurred 9 cases of spring catarrh, 28

of macular keratitis (Kirkpatrick), 477 of ulcus serpens, and 56 of keratomalacia. An interesting observation was that in 5 of 12 Morgagnian cataracts the nucleus had spontaneously been dislocated into the anterior chamber and the eyes were red and glaucomatous. The reports of a number of unusual clinical cases are appended. A. K.

XV.—**Ophthalmic Surgery.** By Professor JOSEF MELLER. Edited by Dr. W. M. SWEET, Philadelphia. III. edition, 364 pages with 219 illustrations, Philadelphia, Pa., published by Blakiston's Son & Co., 1923. Price $5.00.

The wish expressed in the review of Professor Meller's *Augenärztliche Eingriffe* in the ARCHIVES, 1921, that an early translation in English was to be desired, has now been fulfilled, and English-reading ophthalmologists are indebted to Dr. Sweet for making this excellent book available to a larger circle of readers. The subject matter is rearranged, but no change is found in the text. The American edition is dedicated to the Rockefeller Foundation in gratitude for the support it granted to the medical faculties of the Austrian universities during their years of distress. The translation has been well done and the book will be of great assistance to those studying this branch. It must be remembered that though it gives only a description of the methods used in one eye clinic, as is specifically stated, it gains by concentration and the methods described are all approved as they have been slowly evolved and found adequate during many years of trial.

A. K.

XVI.—**Senile Cataract. Methods of Operating.** By Dr. W. A. FISHER, Chicago. 250 pages, published by Chicago Eye, Ear, Nose, and Throat College, Chicago, 1923. Price $2.50.

Dr. Fisher has written in collaboration with a number of eminent operators a description of the various ways to operate for cataract which are at the present time in favor. The capsulotomy operation is taken up by Professor Fuchs of Vienna and Colonel Henry Smith, now in London. The intracapsular method is described by Professor Barraquer of Barcelona, Colonel Henry Smith, Dr. H. T. Holland of Shikarpur Lind, India, Dr. J. W. Wright of Akron, Ohio, and

by Dr. W. A. Fisher. A chapter is added on practice on kitten's eyes which Dr. Fisher has shown to be admirably adapted to acquire the technic of the incision, the iridectomy, and the important procedures with the spoon in presentation or loss of vitreous and with the needle. The book is well illustrated with many pictures. While the views of many of the writers have been published before, it is a convenience to have them now appear in a single volume as the subject is still of the greatest interest to ophthalmologists.

A. K.

XVII.—**Taschenbuch der Augenheilkunde,** for Physicians and Students. By Professor Curt Adam, Berlin. V. edition, 394 pages, 72 illustrations, published by Urban & Schwarzenberg, Berlin and Vienna, 1923. Price 9.60 francs (Swiss).

Adam's manual now appears in a fifth edition which has been carefully revised, and new matter has been added in the form of foreign protein therapy, light therapy, tuberculin treatment, differential diagnosis, and medical ophthalmology. This is an excellent short treatise containing the essential, with especial consideration of treatment. A. K.

ERRATUM.

Dr. R. G. Reese has drawn attention to an error on page 375 in the July issue, where an operation for ptosis was described as a modified Machek operation instead of one which was original with him. A full description of this method will appear in the next number of these ARCHIVES.

OBITUARY.

CARL HESS died on June 28th from pernicious anæmia at the age of sixty. The only son of a prominent ophthalmologist (a close friend of A. von Graefe and long-time secretary of the German Ophthalmological Society), he early turned to ophthalmology and soon became assistant to Sattler in Prague, where he came under the influence of Hering, who was then director of the physiological laboratory in the German University. Hess acted as Hering's assistant for a time and later moved to Leipzig with Sattler and Hering, and in 1891 became first assistant in the Leipzig Eye Clinic and privatdocent. His scientific work began with physiological investigations of the color and light senses, with experiments on retinal fatigue, hemeralopia and adaptation, and color-blindness. These were extended later to the study of the phenomena in the animal kingdom. He also published clinical contributions on fascicular keratitis, on the cause of striped keratitis after cataract extraction, and a new ptosis operation. In 1896 he was called as professor to Marburg and in 1900 to Würzburg.

The subjects of accommodation and pupillary movement also engaged his attention. His rejection of partial contraction of the ciliary muscle and demonstration of the correctness of the Helmholtz theory are well known. The study of the pupil led to the construction of apparatuses which are of clinical utility,—the hemikinesimeter for diagnosis of tract lesions and differential pupilloscopy for topical analysis of pupillary disturbances. The pathogenesis of cataract was studied and a fundamental lesion of the capsular epithelium emphasized. During this period he wrote two large textbooks,—one on Anomalies of Refraction and Accommodation

and one on the Pathology and Therapy of the Lens—and continued his studies on comparative physiology of light and color senses and the mechanism of accommodation in the animal kingdom. The spring vacation was always spent in Naples, in the Zoological Institute. He branched out from the narrow confines of his specialty to the developmental problems of animal life. These studies in comparative physiology of the senses are his greatest achievement and the one through which he acquired a world-wide reputation. In Munich, notwithstanding greater demands of the clinic and consulting practice, he continued his investigations on the vision of animals. The problem of color-blindness was again taken up and new methods for its study evolved. In 1922 the German Ophthalmological Society bestowed the Graefe medal on him, an honor which he shared with Helmholtz, Leber, and Hering, and he was elected Doctor of Philosophy (honoris causa) by the Faculty of Natural Sciences at Göttingen.

His many contributions are surely astounding and only possible in one who combined to a marvelous degree unusual endurance, great facility in working, and a keen power of observation. His writings are characterized by originality of thought and lucidity of style, while his physiological experiments are based on new and ingenious methods of examination. He possessed a remarkable and exuberant vitality. His visit to this country in 1907, on the invitation of the Section on Ophthalmology of the A.M.A., will always be remembered by the many who then made his acquaintance. He gave an address on the Modern Views of the Physiology and Pathology of Accommodation, which was published in the *Transactions*. In 1905 he succeeded Schweigger as editor of the *Archiv für Augenheilkunde*, the German edition of these ARCHIVES. His death in the prime of his scientific life is a great loss to ophthalmology.

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